FINAL

BASELINE HUMAN HEALTH RISK ASSESSMENT FOR VOLATILE ORGANIC CHEMICALS IN GROUNDWATER

EKCO HOUSEWARES FACILITY
MASSILLON, OHIO

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INTRODUCTION AND OBJECTIVES

A baseline human health risk assessment (HHRA) was conducted for the EKCO Housewares Facility in Massillon, Ohio at the request of EPA Region V (EPA, 1994a). The objective was to assess health risks to a hypothetical future on-site resident from exposure to volatile organic chemicals (VOCs) in the upper and lower groundwater units. The approaches and methodology used were in accordance with U.S. EPA risk assessment guidelines (U.S. EPA, 1989a) and applicable supplemental documents (EPA, 1989b; 1991a; 1991b; 1992a). The final document incorporates revisions that were requested by EPA Region V on 24 October 1994 (EPA, 1994b). Formal responses to these comments are contained in Appendix D. Some specific groundwater issues relating to comments can be found in Appendix C.

The risks presented in this report are upper bound values based on the unlikely event that the EKCO facility will be developed for residential purposes. Moreover, risks determined for the upper unit represent unrealistically high values in view of the low probability that this groundwater, untreated, would ever be used for drinking water purposes or other household uses. The uncertainties are discussed in detail in Section 6.

DATA EVALUATION

Data evaluated for this HHRA consisted of sample measurements from the groundwater wells located in the upper (shallow, intermediate) and lower (bedrock) units.

Tables ES-1 and ES-2 present the frequency of detection, range of detected concentrations, mean concentrations, 95% upper confidence limits (95% UCL) concentrations, and exposure concentrations for each chemical detected in the upper and lower units. Section 2 of this

report presents the detailed evaluation of sample data. Appendix A contains the raw data that were evaluated.

EXPOSURE ASSESSMENT

On-site wells were evaluated for groundwater use by a hypothetical future resident assuming shutdown of the production wells and unrestricted future use of the property. Both upper and lower units were evaluated for the following exposure pathways:

- Drinking water ingestion
- Inhalation while showering
- Dermal contact while showering
- Garden produce ingestion

Guidance for calculating exposure doses (daily intakes) was obtained from U.S. EPA (1989a; 1989b; 1991a; 1992a). Detailed dose information can be found in the tables in Section 5 and Appendix B of this report.

TOXICITY ASSESSMENT

Toxicity criteria for carcinogenic and noncarcinogenic effects from IRIS (U.S. EPA, 1994c) and HEAST (U.S. EPA, 1994d) were used according to U.S. EPA (1989a) guidance. Details of the toxicity assessment are presented in Section 4 of this report.

RISK CHARACTERIZATION

The risk results are provided in Section 5 of this report. Tables ES-3 and ES-4 summarize the cancer and noncancer risks by groundwater unit, exposure pathway and age-group.

Table ES-1

Data Summary for the Shallow Groundwater Unit
EKCO Housewares
Massillon, Ohio
(All Concentrations in μg/L)

Chemical	Frequency of Detection	Range of Detected Concentrations	Mean Concentration[a]	Upper 95 Percent Confidence Limit Concentration[a]	Exposure Point Concentration	Maximum Contaminant Level[b]
Acetone	3 / 32	4.4 - 17	3.27	4.25	4.25	NE
Benzene	2 / 32	0.15 - 4	1.1	1.45	1.45	5
2-Butanone	1 / 32	2.6	2.22	2.6	2.6	NE
Carbon disulfide	2 / 32	1 - 1.1	1.12	1.1	1.1	NE
Chloroethane	3 / 32	2 - 6.4	2.51	3.19	3.19	NE
Chloroform	3 / 32	1 - 10	1.4	1.99	1.99	100
1,1-Dichloroethane	27 / 32	1 - 2,200	279	451	451	NE
1,2-Dichloroethane	4 / 32	3.7 - 73	5	9.24	9.24	5
1,1-Dichloroethene	15 / 32	1.5 - 1,900	109	220	220	7
1,2-Dichloroethene (total)	18 / 32	1 - 480	61.4	93.7	93.7	70[c]
Ethylbenzene	3 / 32	0.22 - 3	1.08	1.41	1.41	700
4-Methyl-2-pentanone	1 / 32	7	2.27	2.92	2.92	NE
Tetrachloroethene	4 / 32	0.86 - 55	4.29	7.71	7.71	5
Toluene	5 / 32	0.25 - 130	5.77	12.6	12.6	1,000
1,1,1-Trichloroethane	18 / 32	2.5 - 52,000	2,490	5,380	5,380	200
1,1,2-Trichloroethane	3 / 32	7.4 - 140	7.58	15.6	15.6	5
Trichloroethene	23 / 32	1 - 220,000	10,100	22,300	22,300	5
Vinyl chloride	12 / 32	4 - 150	18.2	28.4	28.4	2
Xylenes (total)	2 / 22	1.4 - 5	1.19	1.56	1.56	10,000

[a] Calculated using "proxy" concentrations for nondetects equal to 1/2 of the sample reporting limit.
[b] U.S. EPA Maximum Contaminant Level (MCL) (U.S. EPA, 1994b).
[c] Value is for *cis* isomer. (MCL for *trans* isomer is 100 μg/L.)
NE - An MCL has not been established for this compound.

TABLE ES-2

DATA SUMMARY FOR THE BEDROCK GROUNDWATER UNIT
EKCO HOUSEWARES
MASSILLON, OHIO
(All Concentrations in μg/L)

Chemical	Frequency of Detection	Range of Detected Concentrations	Mean Concentration[a]	Upper 95% Confidence Limit Concentration[a]	Exposure Point Concentration	Maximum Contaminant Level[b]
1,1-Dichloroethane	5 / 6	2 - 150	52.4	102	102	NE
1,1-Dichloroethene	4 / 6	1 - 56	13.4	31.3	31.3	7
1,2-Dichloroethene (total)	5 / 6	4 - 260	59.0	142	142	70[c]
1,1,1-Trichloroethane	4 / 6	5 - 1,200	216	613	613	200
Trichloroethene	6 / 6	5 - 430	98.7	234	234	5
Vinyl chloride	2 / 6	3.3 - 15	3.38	8.15	8.15	2

[a] Calculated using "proxy" concentrations for nondetects equal to 1/2 of the sample reporting limit.
[b] U.S. EPA Maximum Contaminant Level (MCL) (U.S. EPA, 1994b).
[c] Value is for *cis* isomer. (MCL for *trans* isomer is 100 μg/L.)
NE - An MCL has not been established for this compound.

Table ES-3

Summary of Potential Carcinogenic Health Risks
For the Upper and Lower Units by Exposure Pathway and Age Group
Future On-Site Resident

EKCO Housewares, Massillon, Ohio

Exposure Pathway	Upper Unit			Lower Unit		
	Individual Cancer Risk	Adult Cancer Risk	Individual Cancer Risk	Child Cancer Risk	Adult Cancer Risk	Individual Cancer Risk
Ingestion of Groundwater	2E-03	4E-03	6E-03	2E-04	4E-04	6E-04
Dermal Absorption while Bathing	1E-04	2E-04	3E-04	7E-06	7E-06	2E-05
Noningestion Groundwater Uses	2E-02	1E-02	3E-02	2E-03	2E-03	3E-03
Ingestion of Garden Produce Irrigated with Groundwater	3E-04	4E-04	7e-04	1E-05	1E-05	3E-05
TOTAL	2E-02	2E-02	4E-02	2E-03	2E-03	4E-03

Carcinogenic Risks

As seen in Table ES-3, total (adult and child) lifetime cancer risks were 4E-02 for the upper unit and 4E-03 for the lower unit. For the upper unit, approximately 90% of the risk was from potable water uses, mainly from inhalation while showering and a smaller portion from water ingestion. Garden produce ingestion and dermal absorption while showering accounted for a small fraction (<3%) of total risk but was nevertheless significant at 1E-03. For the lower unit, cancer risk distribution showed the same pattern as for the upper unit.

Table ES-5 summarizes the cancer risks (1,1-dichloroethane) for the upper and lower units by chemical. The highest contributor overall for the upper unit was 1,1-dichloroethene (1,1-DCE) with about 70% of the total risk. 1,1-DCE accounted for 53% of total risk through the inhalation pathway. Trichloroethene (TCE) was the largest contributor to risk by the drinking water ingestion pathway. TCE, 1,1-DCE, and vinyl chloride (VC) accounted for the majority of risk through both the garden produce ingestion and dermal absorption pathways.

For the lower unit, 1,1-DCE was the largest contributor to overall risk, with the majority being associated with inhalation while showering, and about 10% that associated with water ingestion. VC and TCE were the second and third highest contributors, respectively, through the same pathways. Dermal absorption while showering risk and garden produce ingestion were the smallest contributors to total risk (about 4E-05 for all three chemicals evaluated).

Noncarcinogenic Risks

Total noncancer risks for the child and the adult are shown by pathway for the upper and lower units in Table ES-4. Total noncancer HIs in the upper unit for all pathways were 420 (child) and 150 (adult). In the lower unit, respective risks were 16 and 4.2. Ingestion of

Table ES-4

Summary of Potential Noncarcinogenic Health Risks for the Upper and Lower Units by Exposure Pathway and Age Group
Future On-Site Resident
EKCO Housewares
Massillon, Ohio

Exposure Pathway	Upper Unit		Lower Unit	
	Child Hazard Index	Adult Hazard Index	Child Hazard Index	Adult Hazard Index
Ingestion of Groundwater	2.4E+02	1.0E+02	3.8E+00	1.6E+00
Dermal Absorption while Bathing	1.1E+01	5.9E+00	1.5E-01	8.3E-02
Noningestion Groundwater Uses (Inhalation)	1.3E+02	2.8E+01	1.1E+01	2.4E+00
Ingestion of Garden Produce Irrigated with Groundwater	4.4E+01	1.4E+01	5.5E-01	1.7E-01
TOTAL	4.2E+02	1.5E+02	1.6E+01	4.2E+00

Table ES-5

Summary of Key Cancer Risks by Chemical in The Upper and Lower Groundwater Units EKCO Facility, Massillon, Ohio

Exposure Pathway	Chemical	Lifetime Cancer Risk
Upper Unit		
Drinking Water Ingestion	TCE	4E-03
	1,1-DCE	2E-03
	VC	8E-04
Noningestion Uses		
(inhalation while	TCE	1E-03
showering)	1,1-DCE	1E-02
	VC	6E-04
Noningestion uses		
(dermal contact while	1,1-DCE	1E-04
showering)	TCE	2E-04
	VC	2E-05
Garden Produce Ingestion		
	TCE	6E-04
	1,2-DCE	1E-04
	VC	2E-05
Lower Unit	1,1-DCE	3E-04
Drinking Water Ingestion	VC	2E-04
	TCE	1E-04
	1,1-DCE	3E-03
Noningestion uses	VC	2E-04
(inhalation while	TCE	1E-04
showering)		
	1,1-DCE	1E-05
Noningestion uses	VC	5E-06
(dermal contact while	TCE	2E-06
showering)		
Garden Produce Ingestion	1,1-DCE	1E-05
	VC	6E-06
	TCE	6E-06

TCE = trichloroethene; 1,1-DCE = 1,1-dichloroethene; VC = Vinyl chloride

groundwater in the upper unit provided the highest risks (240 and 100 for the child and adult, respectively). Inhalation while showering provided the next highest risks. Ingestion of garden produce and dermal absorption produced the smallest HIs . For the lower unit, the highest total hazard indices were 11 and 2.4 for the child and adult, respectively through inhalation. Smaller risks were associated with ingestion of drinking water. Again, garden produce ingestion and dermal absorption while showering contributed the least.

Table ES-6 summarizes the noncancer hazard indices for the upper and lower units by chemical. TCE was the largest contributor in the both upper and lower units. In the upper unit, TCE contributed HQs of 240 and 100 for the child and adult, respectively. Garden produce ingestion accounted for 44 and 14, and inhalation accounted for 130 and 28. Dermal contact showed the least risk.

In the lower unit, 1,1-DCE contributed to noncancer risk the greatest with a HQ of 7.6 in the child through inhalation. TCE had HQs of 2.5 and 1.1 for the child and adult, respectively. Dermal absorption and garden produce ingestion were negligible for any individual chemical.

UNCERTAINTY ANALYSIS

Table ES-7 is a summary of uncertainties. These are discussed in greater detail in Section 6 of the report. The greatest uncertainty is the assumption that the upper groundwater unit could be used for future residents for potable purposes (drinking water, showering). This groundwater unit is not currently used off-site as such, except for the potential watering of gardens. Therefore, the risk associated with the upper unit should be completely attributable to garden produce ingestion.

Risks are overestimated in both units because no degradation or dilution of VOCs was assumed over a lifetime of exposure. Normal biodegradation processes and volatilization

Table ES-6

Summary of Key Cancer Risks by Chemical in The Upper and Lower Groundwater Units EKCO Facility, Massillon, Ohio

		Hazard Quotient	
Exposure Pathway	**Chemical**	**Child**	**Adult**
Upper Unit			
Drinking Water Ingestion	TCE	240	110
	1,1-DCE	1.6	--
	VC		
Noningestion Uses (inhalation while showering)	TCE	110	23
	1,1-DCE	12	2.5
	1,2-DCA	5	1.1
Noningestion uses (dermal contact while showering)	TCE	10	5.9
Garden Produce Ingestion	TCE	44	13
Lower Unit			
Drinking Water Ingestion	TCE	2.5	1.1
Noningestion (inhalation)	1,2-DCE	7.6	1.6
	1,1-DCE	1.7	--

Table ES-7

Summary of Uncertainty Analysis
EKCO Housewares Facility

Uncertainty Element	Effects on Risk Estimate		
	Potential for Overestimation	Potential for Underestimation	Potential for Over- or Underestimation
Exposure Assessment			
• Standard assumptions regarding body weights, skin surface areas, inhalation rates, and life expectancy			Low
• Media intake rates	Moderate		
• Exposure frequencies	Moderate		
• Exposure durations	Moderate		
• Use of upper unit for residential drinking water and other household uses	High		
• Dilution and degradation of VOCs	High		
Toxicity Assessment			
• Use of chronic RfDs for estimating noncancer risk in children	Moderate		
• Cancer slope (potency) factors	High		
• 1,1-Dichloroethylene • Trichloroethylene • Vinyl chloride	Moderate	Moderate	High
• Reference doses	Moderate-High		

into outdoor air (gardening scenario) will lower the actual exposure point concentrations. Pump and treatment systems in place now or planned for the near future will also substantially reduce potential exposure concentrations over the 30 year future residential lifetime.

CONCLUSIONS

Cancer risks based on future residential development exceed the 1E-04 benchmark used by EPA (1992b) for both upper and lower units, with the upper (4E-02) being one order of magnitude higher than the lower unit (4E-03).

Based on the unlikely potential for the upper unit being used for drinking water and household noningestion uses, and because dilution, degradation and removal were not assumed to occur, the risks for this unit are significantly overestimated and are realistically only related to those exposures that would occur through garden produce ingestion. Risks for the lower unit are also overestimated because degradation, dilution and removal of VOCs was not taken into account during the risk characterization. Finally, based on the low probability that the site will be developed residentially, risks for both units are likely to be hypothetical.

REFERENCES

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SECTION 1
INTRODUCTION

1.1 OBJECTIVES

This report is the final baseline human health risk assessment for the EKCO Housewares facility in Massillon, Ohio. A draft of the risk assessment was prepared in response to a request from EPA Region V in a letter dated 22 June 1994 (EPA, 1994a). The final report was prepared after reviewing comments from EPA V as described in their letter of 24 October 1994 (EPA, 1994b). Responses to these comments can be found in Appendix D of this report. The objective is to determine human health risks from exposure to volatile organic chemicals (VOCs) detected in several on-site groundwater units based on the no-action alternative (i.e., in the absence of remedial or corrective action). The no-action alternative is defined for the EKCO facility as the potential future residential development of the site. Note that some interim remediation has been performed for one of the units (the on-site bedrock aquifer), and therefore risks for this unit reflect post-remediation exposure.

The approaches and methodologies used in conducting the baseline risk assessment for the EKCO facility are in accordance with *Risk Assessment Guidance for Superfund* (EPA, 1989) and Supplemental guidance (EPA, 1991a; 1991b, 1991c).

1.2 SITE LOCATION AND DESCRIPTION

1.2.1 Facility Location

The EKCO facility occupies approximately 13 acres located in the town of Massillon, Stark County, Ohio (Figure 1-1). The area immediately surrounding the facility is largely urban and industrial, although land use to the northwest is more rural with a larger proportion of open space. The EKCO property is approximately triangular in shape and is located approximately 1,500 feet west of the Tuscarawas River. The northern border of the facility is Newman Creek, the western border is the Penn Central Railroad, and the eastern border

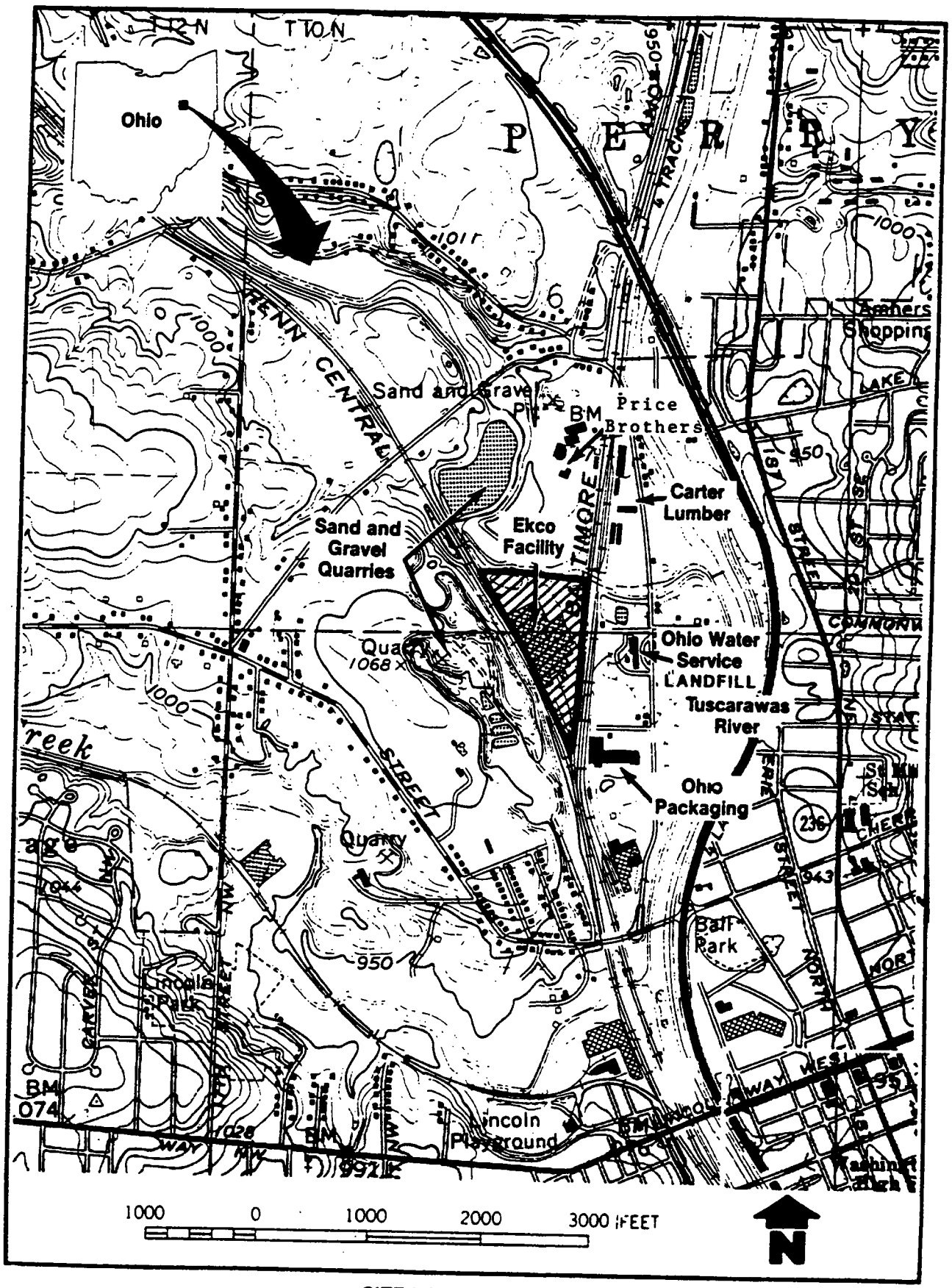


FIGURE 1-1 SITE LOCATION MAP
EKCO HOUSEWARES, INC., MASSILLON, OHIO
(Ref. 7.5 Minute Massillon Quad, Ohio, 1978)

is the Baltimore and Ohio Railroad.

A variety of the business are located adjacent to the EKCO plant. These include Ohio Packaging (paper) to the south, sand and gravel quarries to the west and northwest, Carter Lumber (retail) and Price Brothers (concrete pipe manufacturing) to the north, and the Ohio Water Service (OWS, public water supply) waterworks to the east and northeast. A relatively large, inactive municipal landfill exists just east of the OWS facility. The Baltimore and Ohio Railroad owns numerous spurs and sidings east of and adjacent to the EKCO plant that are used for the storage of rail cars and track maintenance vehicles.

1.2.2 Facility History

A summary of the history of the EKCO facility is presented in Table 1-1. In the 1940s, the EKCO facility manufactured aluminum and stainless steel cookware. By 1951, with the United States becoming involved in the Korean Conflict, the plant began manufacturing 90-mm and 105-mm shell casings for the military. The resulting increase in production necessitated the drilling of two production wells at the facility (W-1 and W-2, as shown in Figure 1-2). In 1953, a sewer was constructed that carried the plant waste to a discharge point along Newman Creek. At approximately the same time, a surface impoundment was constructed along the northern property boundary adjacent to Newman Creek. Sludge from waste treatment was discharged to the surface impoundment.

During 1954, EKCO began coating cookware manufactured at the facility. Chlorinated solvents [primarily trichloroethene (TCE) and 1,1,1-trichloroethane (1,1,1-TCA)] were used to clean the products prior to coating, although these solvents were never used by EKCO at the same time. Between 1954 and 1964, EKCO used TCE for cleaning parts; EKCO changed its process solvent to 1,1,1-TCA in 1964 and has used TCA since then.

In 1965, American Home Products Corporaton (AHPC) acquired EKCO. Porcelain and Teflon coating units were installed at the EKCO facility in 1967. In 1969, with the

TABLE 1-1

EKCO FACILITY HISTORY

Date	EKCO Site History
Ca 1929-32	First recorded activities at facility. Property is owned by Standard Oil Company.
Ca 1929-42	Fort Pitt/Massillon Bridge Works - Manufacture of iron and steel bridges and structural iron.
1945	Manufacturing Aluminum and stainless steel cookware.
1950	Production wells W-1 and W-2 were installed and put into service to produce water for plant activities. Well W-1 has been used continuously since then, and well W-2 was used until it was taken out of service in the late 1970s.
1951	The plant began with the U.S. involvement in the Korean conflict manufacturing 90-mm and 105-mm shell casings for the military. This increase in production necessitates the drilling of two production wells (W-1 and W-2).
1953	A surface impoundment was constructed along the northern property boundary adjacent to Newman Creek, Sludge frame waste treatment was discharged to it. Began copper-plating cookware, used primarily TCE or 1,1,1-TCA to clean cookware.
1964	Stopped using TCE; 1,1,1-TCA was used in its place.
1965	AHPC acquired EKCO Housewares.
1967	Installation of porcelain and teflon coating units.
1969	Surface impoundment meets newly formed NPDES regulations and permits.
March 1986	The air stripper system was installed and put into service.
July 1974	NPDES Permit No. C-3094BD was issued to EKCO.
1977	EKCO discontinued the manufacturing of aluminum and porcelain cookware and the use of the lagoon ceased.
1978	All copper plating operations ended; the principal manufactured products were pressed and coated nonstick bakeware.
1979-1980	The only major documented solvent spill to date at the facility was recorded; neither the exact location nor the extent of the spill was documented.
1980	The surface impoundments was reactivated under the existing NPDES permit and received housing alkaline degreaser filter water.
March 1984	In applying for a renewal of their NPDES permit, the plant was required to analyze on-site well water for VOCs, this analysis indicated the presence of 1,1,1-TCA and TCE.
June 1984	All discharges to lagoon ceased.
1984	AHPC sold EKCO Housewares to the EKCO Group.
May 1992	EKCO reported a 330-gallon 1,1,1-TCA spill to EPA. EKCO removed 50 tons of soil from the area of the solvent release.
Present	EKCO continues to manufacture pressed and coated nonstick bakeware. A silicon-based compound is presently used to coat the bakeware to create the nonstick surface.

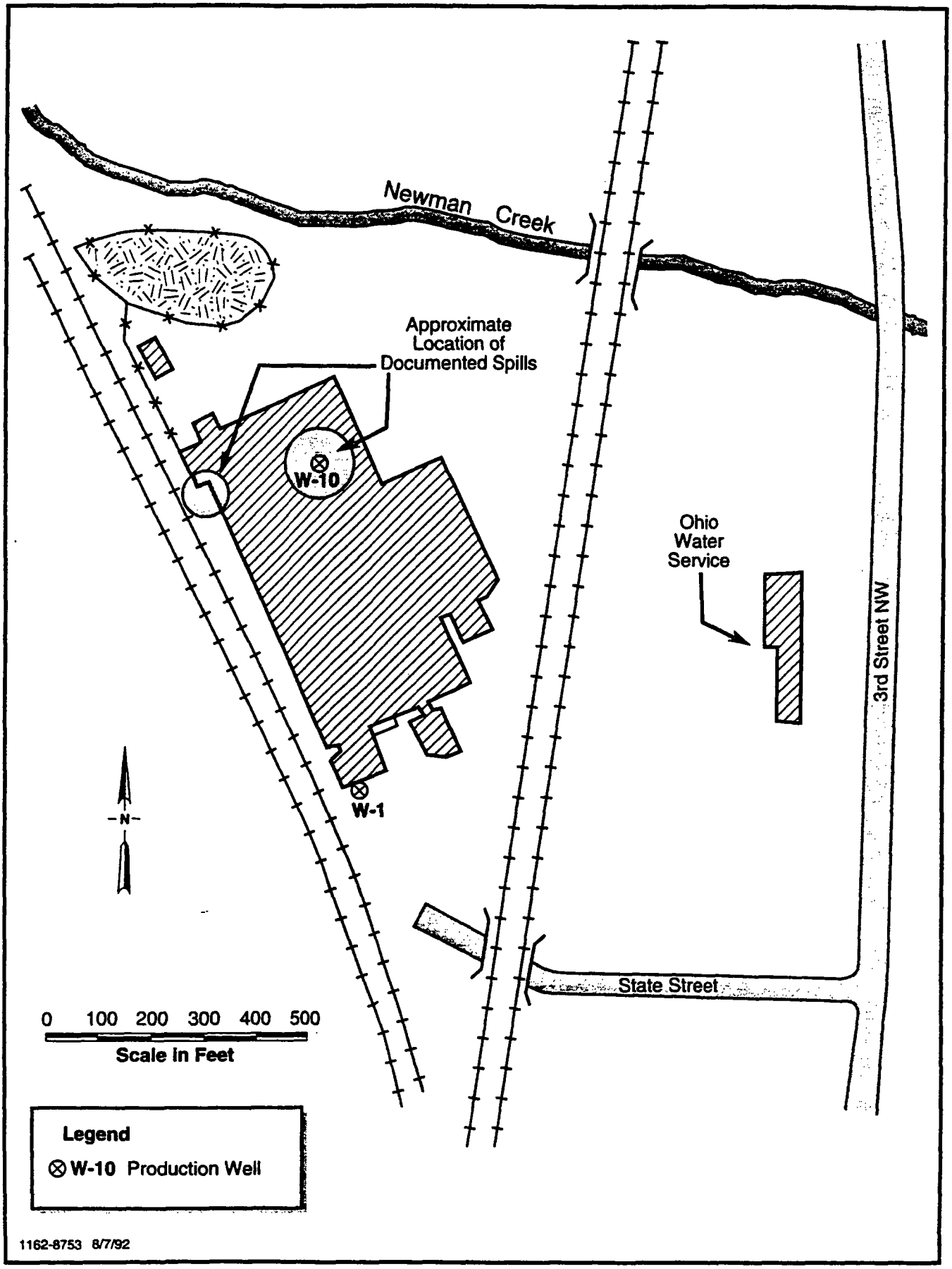


FIGURE 1-2 APPROXIMATE LOCATION OF THE ONLY DOCUMENTED SPILLS

development of the National Pollutant Discharge Elimination System (NPDES) and its attendant regulations and permit requirements, a permit was issued by the State of Ohio for the surface impoundment to discharge waste products associated with plant activities. The waste products permitted for discharge included:

- Deionizers from copper coating operations (hydrochloric acid and sodium hydroxide).
- Washings and waste material from manufacturing porcelain-Teflon coated aluminum cookware (aluminum frit, various pigments: inorganic oxides of lead, cadmium, selenium, and cobalt).
- Alkaline washer fluids to clean aluminum cookware.

In July 1994, NPDES Permit No. C-3094BD was issued to the EKCO facility. As the 1970s progressed, EKCO discontinued the manufacturing of aluminum and porcelain cookware. Use of the surface impoundment ceased in 1977. By the end of 1978, all copper coating operations had ended and the principal products manufactured at the facility became pressed and coated nonstick bakeware.

There have been only two documented solvent releases at the facility. Correspondence between EKCO and the Ohio Environmental Protection Agency (OEPA) identified a solvent release that occurred between 1979 and 1980 in the vicinity of production well W-10 (Figure 1-2). Neither the exact location nor the extent of the spill was documented. Well W-10 is located in a sump covered by a grate mounted flush with the plant floor, and the well head sump may receive floor drainage. In May 1992, EKCO reported to EPA a release of 330 gallons of 1,1,1-TCA in an area northwest of the plant. In response, 50 tons of soil were excavated in the presence of an OEPA representative. The soil was containerized and transported to the Enviro Safe Services of Ohio, Inc. hazardous waste landfill in Toledo, Ohio.

The surface impoundment was reactivated in 1980 under the existing NPDES permit and received alkaline degreaser filter water until mid-1984. In 1984 the facility was acquired by

the EKCO Group, Inc. In March 1984, when the plant applied for a renewal of its NPDES permit, analysis of on-site well water for VOCs was required. The analysis indicated the presence of 1,1,1-TCA and TCE. This discovery resulted in subsequent investigations at EKCO. These investigative activities are described in Subsection 1.3 of this report. The EKCO facility continues to manufacture pressed and coated nonstick bakeware. A silicone-based compound is presently used to coat the bakeware to create the nonstick surface.

1.3 SITE HYDROGEOLOGY

The EKCO facility is situated on the western flank of a glacial valley that extends to the north and south and was carved from Pennsylvanian age sedimentary rocks during Pleistocene glaciation. The majority of the EKCO facility is generally flat except for the northern border of the facility which slopes steeply toward Newman Creek. Surface water runoff at the facility discharges to Newman Creek by two pathways: in the northern part of the facility it flows directly into Newman Creek, and surface water discharge for the rest of the facility is routed through the storm sewer system, which discharges into Newman Creek through Outfall No. 001 located just east of the Baltimore and Ohio Railroad tracks. Figure 1-3 shows the monitor well locations and some important site features.

Prior to the construction of the facility in 1945, a cover of fill material was used to level the natural glacially-formed topography at the building site. Beneath the fill, the glacially deposited sediments form a thin veneer 15 to 30 feet thick in the western portion of the site where the depth to bedrock is shallow. The sediments infill the glacial valley to the east, reaching a maximum on-site thickness of approximately 110 feet at the eastern property boundary. Further off-site to the east, these unconsolidated sediments reach thicknesses exceeding 252 feet.

Figures 1-4 and 1-5 show generalized geologic cross-sections for the stratigraphic units in the area of the site. These cross-sections show that two unconsolidated sand units exist on-site -- the shallow and intermediate units. Off-site, a third deep sand and gravel unit

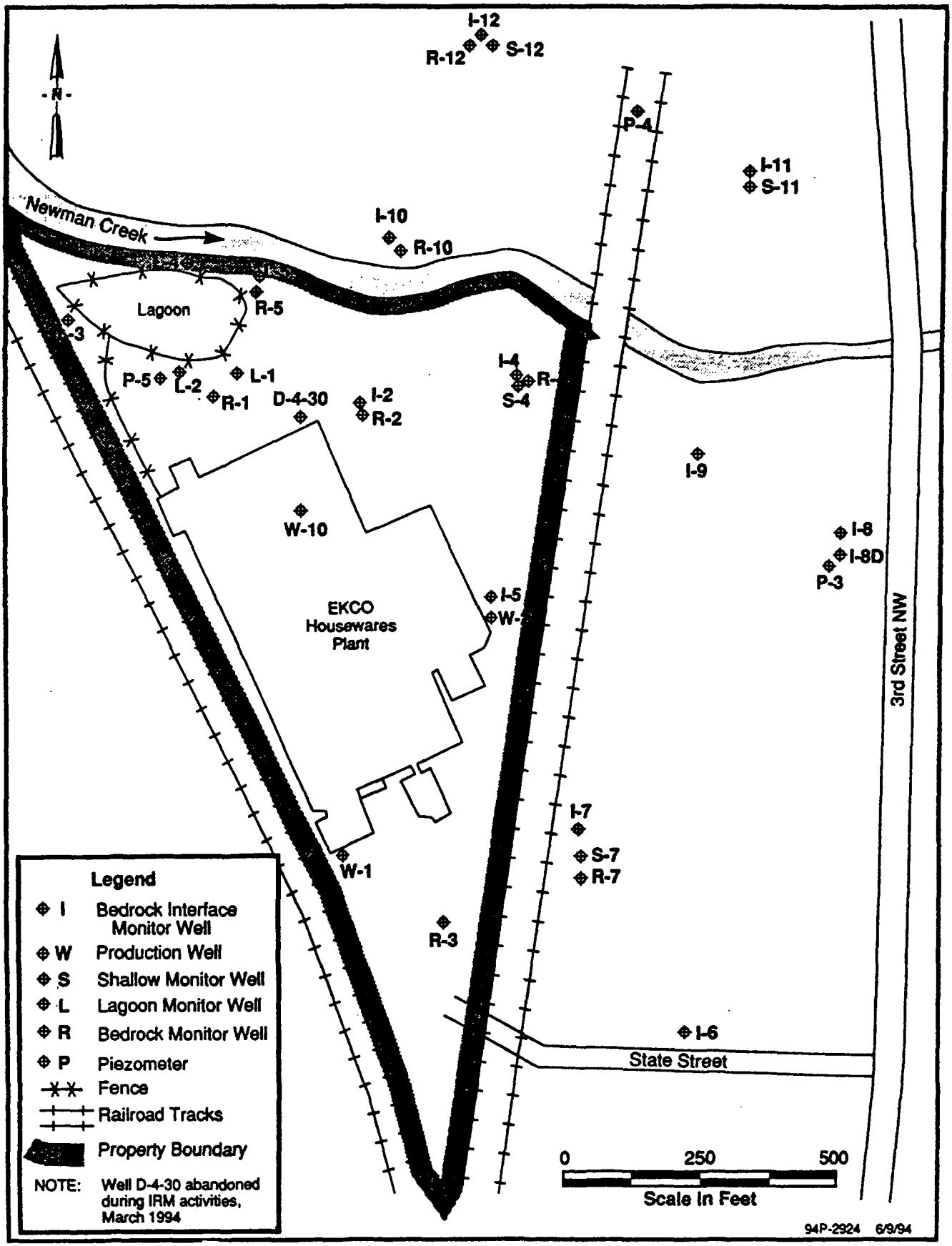
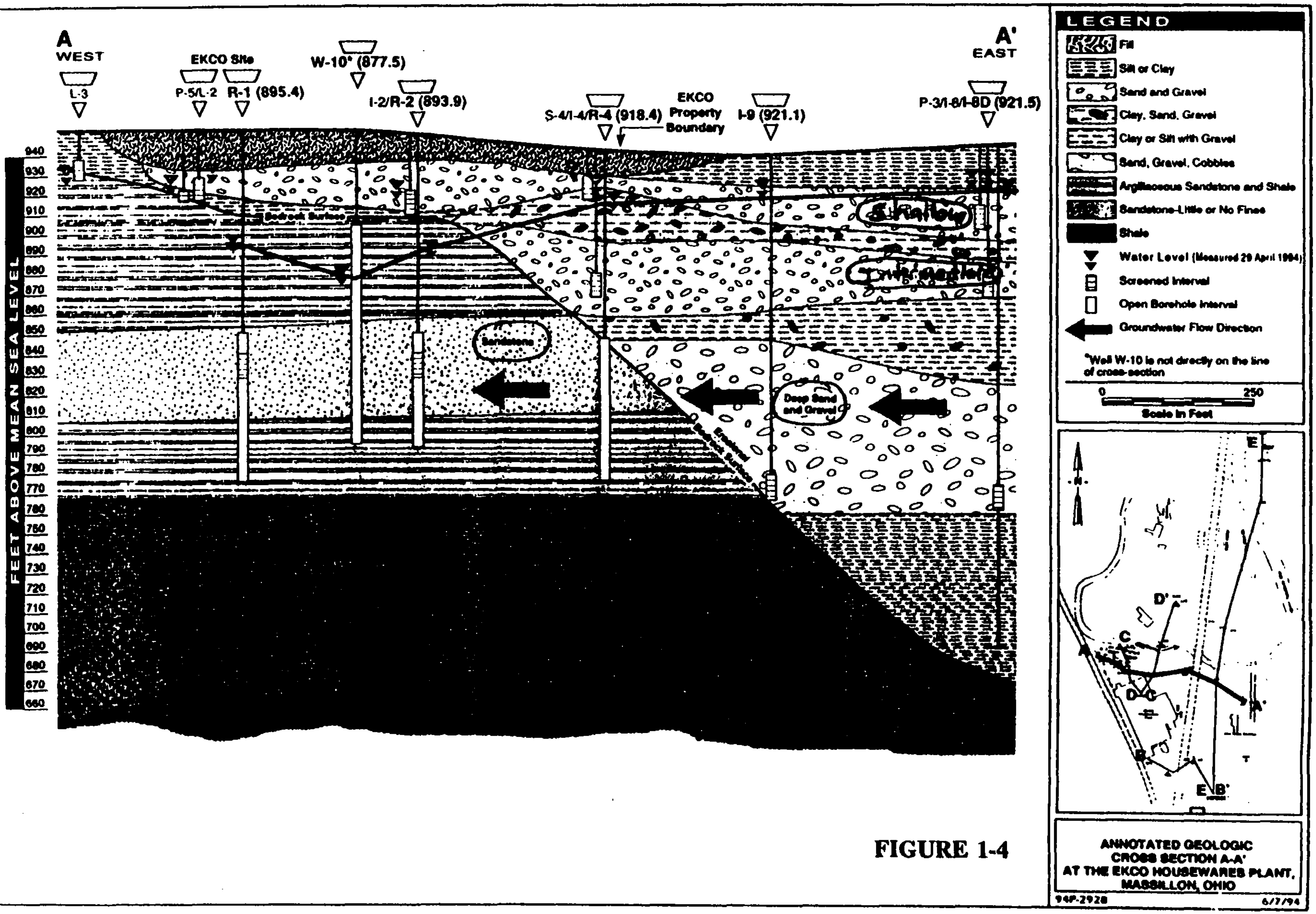


FIGURE 1-3 SITE PLAN
EKCO HOUSEWARES FACILITY
MASSILLON, OHIO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WEST
A'
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EKCO Site
P-5/L-2
R-1 (895.4)
W-10* (877.5)
I-2/R-2 (893.9)
S-4/I-4/R-4 (918.4)
EKCO
Property
Boundary
I-9 (921.1)
P-3/I-8/I-8D (921.5)
FEET ABOVE MEAN SEA LEVEL
940
930
920
910
900
890
880
870
860
850
840
830
820
810
800
790
780
770
760
750
740
730
720
710
700
690
680
670
660
Bedrock Surface
Sandstone
Deep Sand and Gravel
Eroded Bedrock Surface
LEGEND
Fill
Silt or Clay
Sand and Gravel
Clay, Sand, Gravel
Clay or Silt with Gravel
Sand, Gravel, Cobbles
Argillaceous Sandstone and Shale
Sandstone-Little or No Fines
Shale
Water Level (Measured 29 April 1994)
Screened Interval
Open Borehole Interval
Groundwater Flow Direction
*Well W-10 is not directly on the line of cross-section
0
250
Scale in Feet
N
E
D'
C
D
C'
B
E
B'
A'
ANNOTATED GEOLOGIC
CROSS SECTION A-A'
AT THE EKCO HOUSEWARES PLANT,
MASSILLON, OHIO
94P-2928
6/7/94

FIGURE 1-4

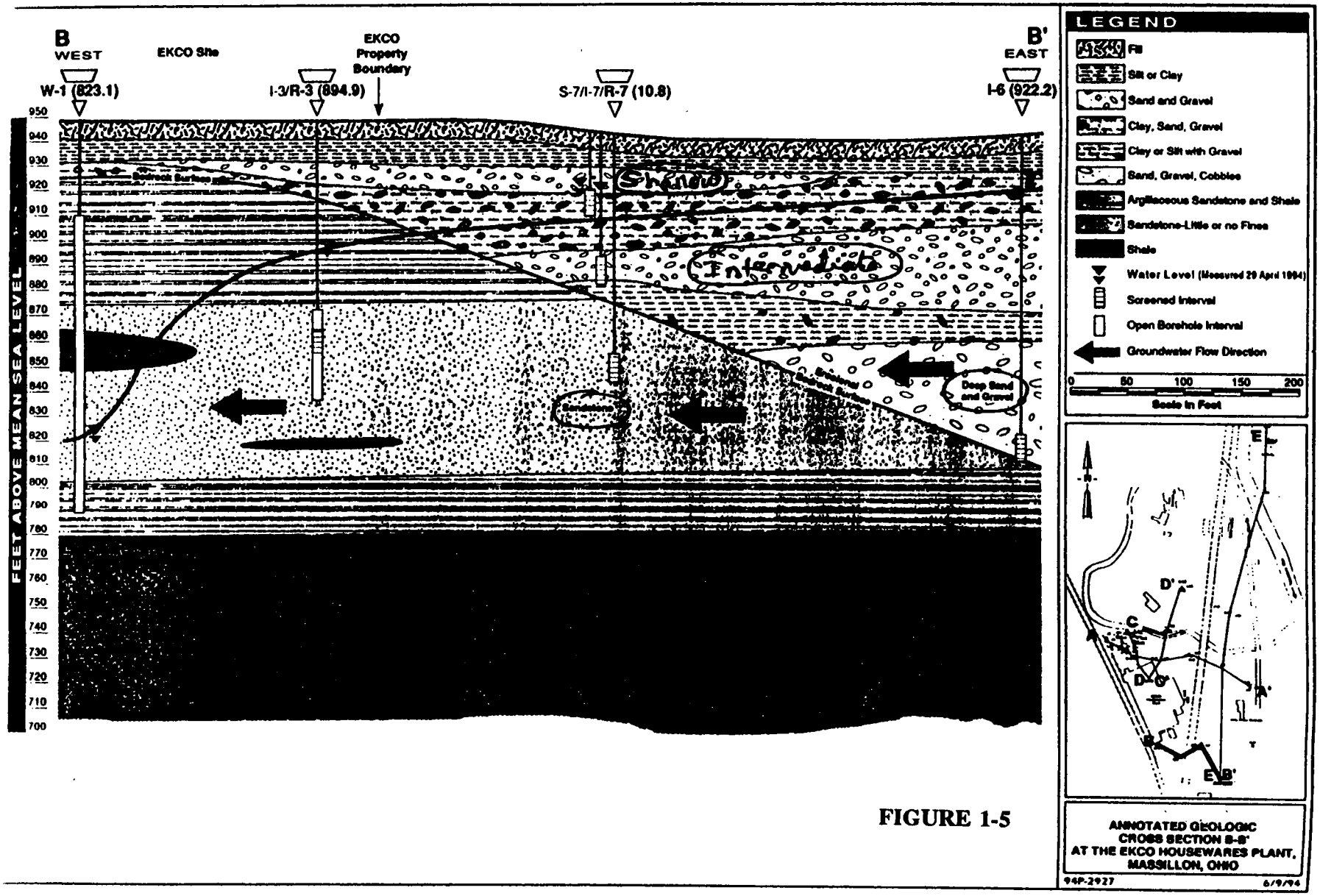
B
WEST
EKCO Site
EKCO
Property
Boundary
B'
EAST
W-1 (823.1)
I-3/R-3 (894.9)
S-7/I-7/R-7 (10.8)
I-6 (922.2)
FEET ABOVE MEAN SEA LEVEL
950
940
930
920
910
900
890
880
870
860
850
840
830
820
810
800
790
780
770
760
750
740
730
720
710
700
Shallow
Intermediate
Deep Sand and Gravel
LEGEND
Fill
Silt or Clay
Sand and Gravel
Clay, Sand, Gravel
Clay or Silt with Gravel
Sand, Gravel, Cobbles
Argillaceous Sandstone and Shale
Sandstone-Little or no Fines
Shale
Water Level (Measured 29 April 1994)
Screened Interval
Open Borehole Interval
Groundwater Flow Direction
0
50
100
150
200
Scale in Feet
D'
C
D
B
E
E'
B'
ANNOTATED GEOLOGIC
CROSS SECTION B-B'
AT THE EKCO HOUSEWARES PLANT,
MASSILLON, OHIO
94P-2927
6/9/94

FIGURE 1-5

exists further to the east. These unconsolidated sand units are typically separated by silt and clay units. In general, the shallow, intermediate and deep sand units act as the primary medium for groundwater flow and the low permeable silt and clay units act as barriers to groundwater flow; however, variations in the permeability occur locally. North of well I-2 the silt and clay layer between the shallow and intermediate unit pinches out. In this area the shallow and intermediate units are hydraulically connected to each other.

The bedrock at the site consists of a relatively thick sandstone unit which is both overlain and underlain by layers of shale and argillaceous sandstone. The sandstone unit has a relatively high permeability and is the primary bedrock water bearing unit at the site. The layers of shale and argillaceous sandstone have a relatively low permeability and generally act as barriers to groundwater flow.

There are five groundwater production wells in the area of the site, which have an effect on the local groundwater flow system. EKCO uses two sandstone bedrock production wells W-1 and W-10 pumping at a total of approximately 600 gpm to provide water for the manufacturing facility. Ohio Water Service (OWS) pumps three production wells (OWS-1, -1 and -3) intermittently from the deep sand and gravel unit at a total of up to 2,800 gpm to provide water for the City of Massillon. The OWS production wells are located approximately 2,000 feet northeast of the EKCO facility in the deep sand and gravel glacial valley.

Groundwater contour maps for the shallow and intermediate units are presented on Figures 1-6 and 1-7. The figures show that the groundwater in these two units flows toward the production wells W-1 and W-10. Figure 1-5 shows that the shallow unit is dewatered beneath a large portion of the site, and the cross-sections (Figures 1-4 and 1-5) show that the intermediate unit only exists beneath the eastern portion of the site in the area of wells (I-4 and I-7. The shallow and intermediate units have been grouped together for the risk assessment evaluation because of several similar characteristics. Groundwater yield is not sufficient to support drinking water use from either of these units (See Appendix C). They

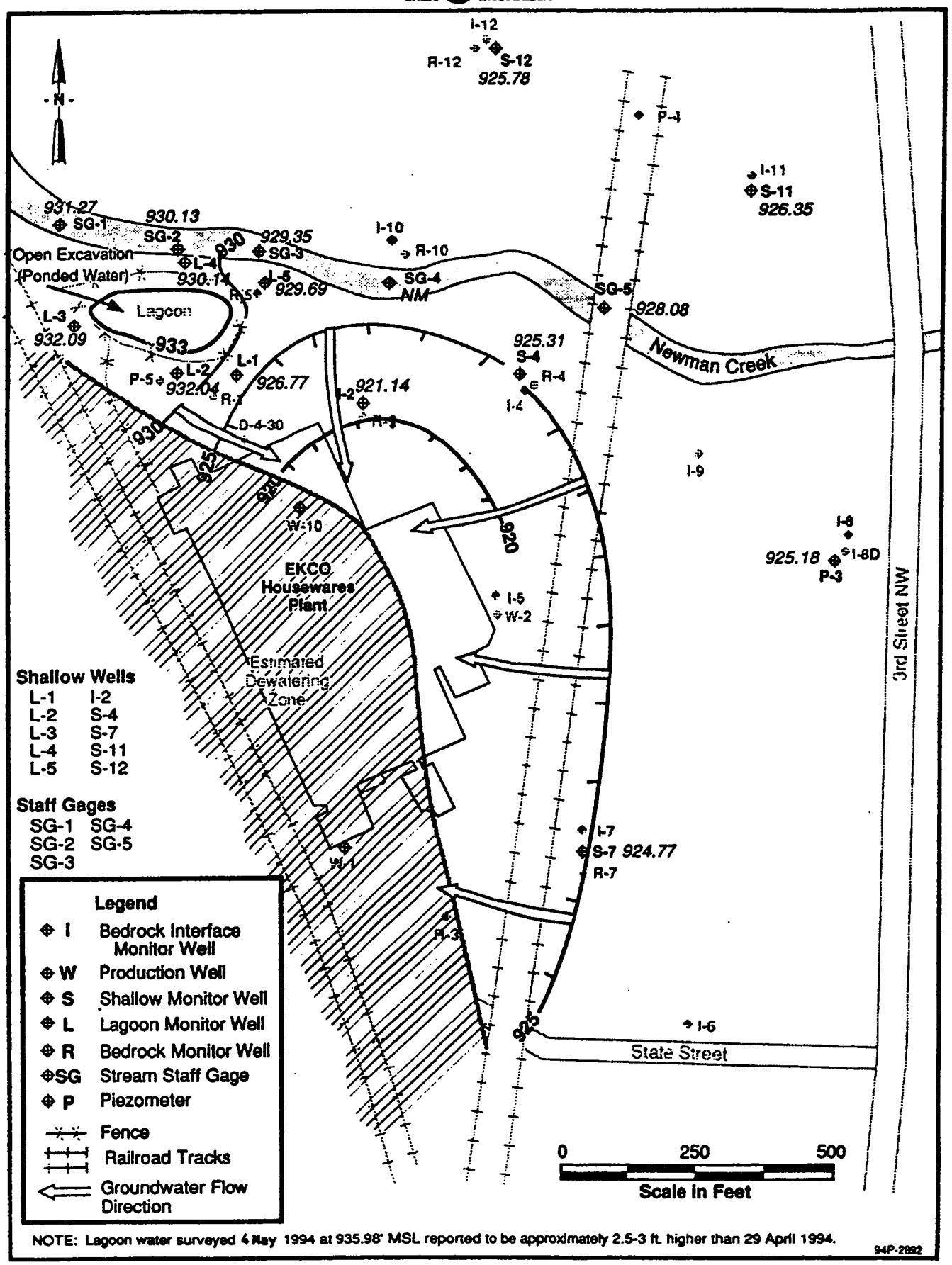

FIGURE 1-6 **GROUNDWATER CONTOUR MAP OF WELLS COMPLETED IN THE SHALLOW SAND AND GRAVEL WATER BEARING ZONE – 29 APRIL 1994 EKCO HOUSEWARE FACILITY – MASSILLON, OHIO**

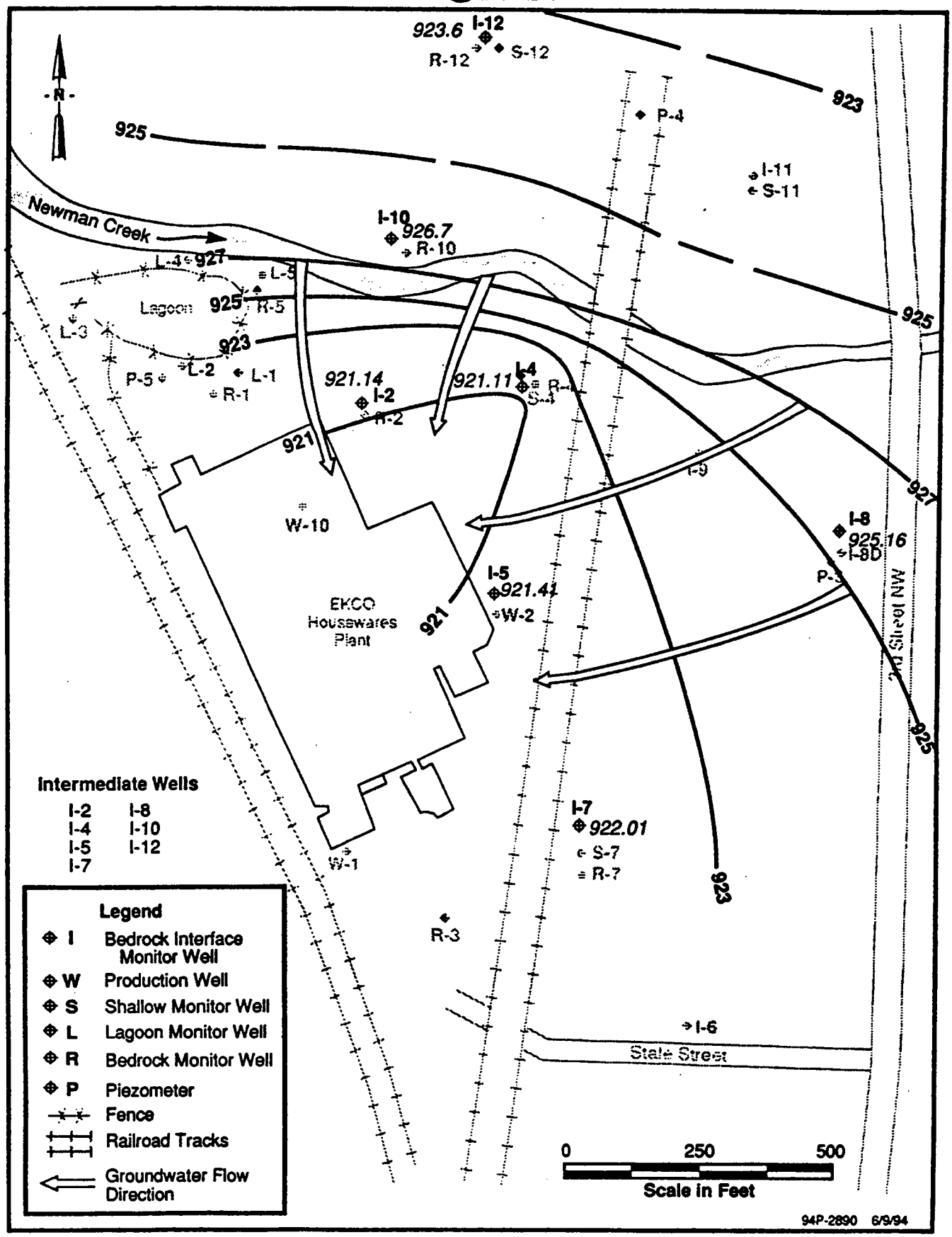

FIGURE 1-7 GROUNDWATER CONTOUR MAP OF WELLS COMPLETED IN THE INTERMEDIATE SAND AND GRAVEL WATER BEARING ZONE, WATER LEVELS MEASURED 29 APRIL 1994 EKCO FACILITY – MASSILLON, OHIO

only exist in saturated conditions beneath a small portion of site, and geologic logs from the northern portion of the site indicate that these units are hydraulically connected in some areas.

A bedrock groundwater contour map is presented in Figure 1-8 and shows that a significant bedrock drawdown cone exists beneath the entire EKCO site. This drawdown cone is induced by the pumping of EKCO production wells W-1 and W-10. The water from these two production wells is treated by an on-site air stripper system. Off-site residential wells obtain drinking water either from the sandstone bedrock or the deep glacial sand and gravel aquifer.

Packer testing activities conducted during the RCRA Feasibility Investigation (RFI) indicated that some of the bedrock wells may have had leaking casings, allowing groundwater to flow through the well annulus from the shallow overburden to the sandstone bedrock. The casings for bedrock wells R-1, R-2, R-3, W-1, W-2 and W-10 were sealed during Interim Remedial Measure (IRM) activities conducted in April 1994 (WESTON, 1994).

In summary, the risk assessment will evaluate groundwater as two distinct water-bearing zones at the site; the Upper Unit and the Lower Unit. Groundwater within the Upper Unit typically occurs under unconfined or semiconfined conditions and is represented by shallow and intermediate well data. The general direction of groundwater flow in the Upper Unit is toward wells W-1 and W-10. Groundwater within the Lower Unit is typically semi-confined by overlying shale and is represented by on-site bedrock well data. The direction of groundwater flow in the Lower Unit is also toward wells W-1 and W-10.

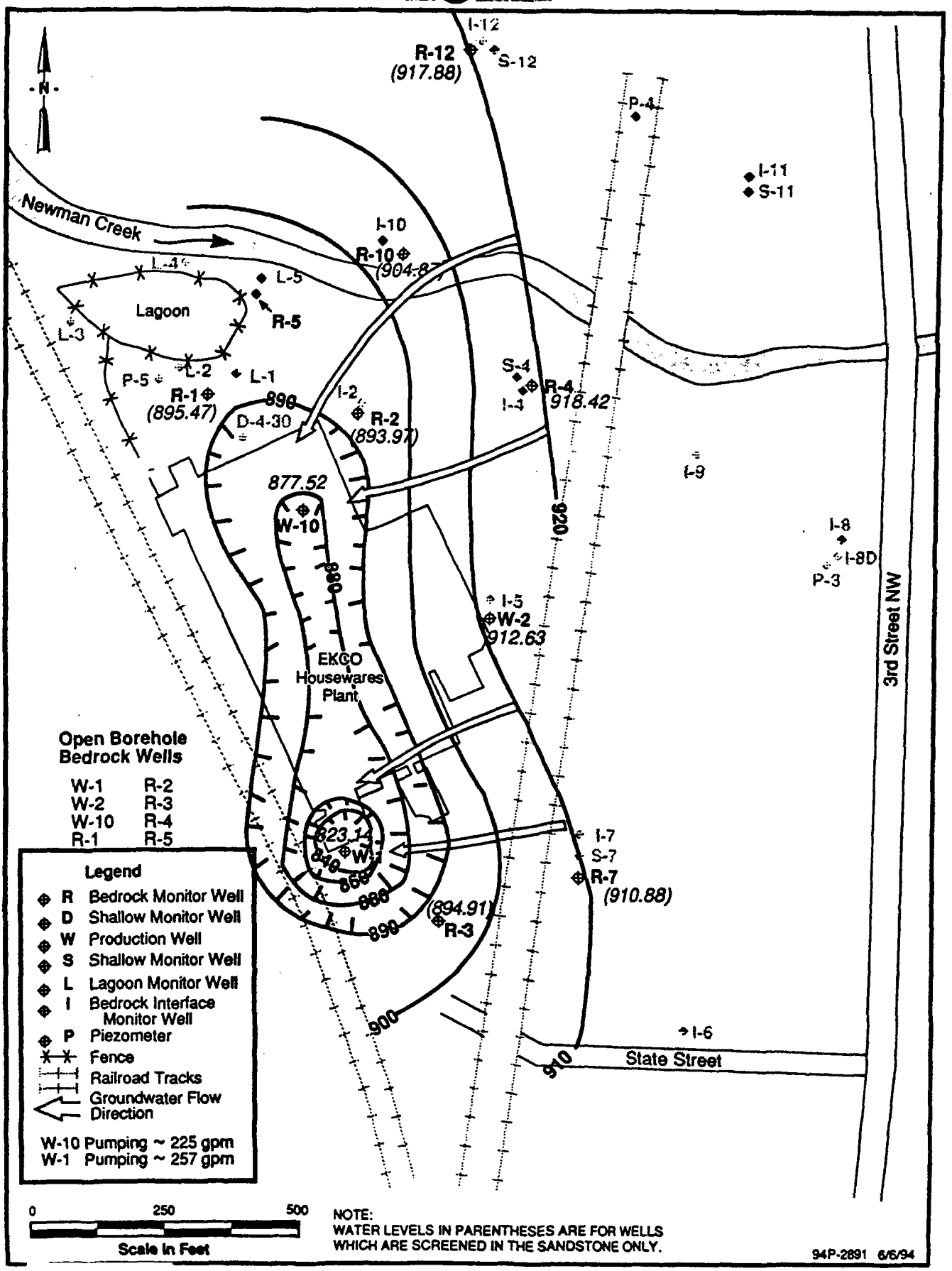

FIGURE 1-8 **GROUNDWATER CONTOUR MAP OF WELLS COMPLETED IN THE BEDROCK, 29 APRIL 1994 EKCO HOUSEWARES FACILITY – MASILLON, OHIO**

1.4 ORGANIZATION OF REPORT

The remainder of this report is divided into the following sections:

- *Data Evaluation (Section 2)* presents an evaluation and summary of the chemicals detected in the groundwater units at the EKCO facility. This characterization is comprised of three principal technical elements:
  - The evaluation of groundwater data used in the human health risk assessment.
  - The selection and identification of chemicals of potential concern for which human health risks were assessed.
  - Comparison of the concentrations for the chemicals of potential concern with applicable or relevant and appropriate requirements (ARARs) such as MCLs.
- The *Exposure Assessment (Section 3)* presents the pathways by which the hypothetical on-site future resident (child and adult) could come in contact with the chemicals of potential concern, the exposure algorithms and input assumptions used, and the calculated exposure concentrations and estimated daily intakes (doses). Guidance for estimating the reasonable maximum exposure (RME) was obtained from EPA (1989).
- The *Toxicity Assessment (Section 4)* presents a discussion of the carcinogenic and noncarcinogenic toxicity criteria used to evaluate pathway specific human health risk.
- The *Risk Characterization (Section 5)* summarizes and discusses the risk results. This section will present the risk summary tables.
- The *Uncertainty Analysis (Section 6)* discusses those chemical/pathway specific risks that had the greatest influence on total risk and the magnitude of over- or underestimation of risk that occurred as a result of the assumptions used in the risk assessment. Also included in this section is a discussion of central tendency exposures (EPA, 1992).
- *Appendices* present (A) the raw data, (B) the exposure dose and risk calculations, (C) groundwater data analysis issues, and (D) WESTON responses to EPA Region V comments on the draft risk assessment.

1.5 REFERENCES

EPA (U.S. Environmental Protection Agency), 1989. *Risk Assessment Guidance for Superfund. Volume I: Human Health Evaluation Manual, Part A.* Interim Final. Office of Solid Waste and Emergency Response. Washington, D.C. OSWER Directive 9285.701A.

EPA (U.S. Environmental Protection Agency), 1991a. *Risk Assessment Guidance for Superfund, Volume I - Human Health Evaluation Manual Supplemental Guidance, "Standard Default Exposure Factors."* Interim Find. OSWER Directive 9285.6-03.

EPA (U.S. Environmental Protection Agency), 1991b. *Risk Assessment Guidance for Superfund, Part B: "Development of Risk-based Preliminary Remediation Goals."* OSWER Directive 9285.7-01B. 13 December 1991.

EPA (U.S. Environmental Protection Agency), 1991c. *Risk Assessment Guidance for Superfund. Part C.* OSWER Directive 9285.701C.

EPA (U.S. Environmental Protection Agency), 1991. *Supplemental Guidance: "Standard Default Exposure Factors."* OERR. Washington, D.C. OSWER Directive 9285.6-03; March, 1991.

EPA (U.S. Environmental Protection Agency), 1992. *Guidance on Risk Characterization for Risk Managers and Risk Assessors.* Memorandum from F. Henry Habicht II to Assistant and Regional Administrators. 26 February 1992.

EPA (U.S. Environmental Protection Agency), 1994a. Letter to P. McDonald (American Home Products Corporation, Madison, NJ 07940) from S. Averill (U.S. EPA Region V, RCRA Enforcement Branch, Chicago, IL, 60604-3590). 22 June 1994.

EPA (U.S. Environmental Protection Agency), 1994b. Letter to P. McDonald (American Home Products Corporation, Madison, NJ 17940) from S. Averill (U.S. EPA Region V, RCRA Enforcement Branch, Chicago, IL 60604-3590). 24 October 1994.

SECTION 2
DATA EVALUATION

2.1 APPROACH

The objectives of the data evaluation process were to review and summarize the analytical data for each of the groundwater units examined in the risk assessment in order to select chemicals of potential concern and develop exposure point concentrations. Only on-site well locations were evaluated since only future on-site uses were assessed (see Section 3). Moreover, only volatile organic chemical (VOC) data for the on-site wells were assessed, as requested by EPA (1994a).

2.1.1 Upper Unit

The upper (shallow/intermediate) groundwater unit was characterized using data from sampling events in 1988, 1991, and 1992 for the following wells (analytical data is contained in Appendix A):

- S-4, S-7 (note: no 1988 data available for S-4)
- D-4-30
- L-1, L-2, L-4, L-5 (L-3, background)
- I-2, I-4, I-5, I-7

Wells I-8, I-9, I-11, I-12, I-13, R-12, S-11 and S-12 were at off-site locations and therefore were not evaluated.

2.1.2 Lower Unit

Data from the lower (bedrock) groundwater unit were evaluated using currently available post-Interim Remedial Measures (post-IRM) data (Spring, 1994) for the following on-site wells:

- R-1, R-2, R-3, R-5, W-1, W-10

– may need to resample all R-wells

Bedrock well data from the years prior to interim remediation were not evaluated since these data no longer represent baseline conditions. Prior to retrofitting, the R-well data represented a combination of the overburden and bedrock groundwater. Retrofitting prevented mixing of the overburden and bedrock groundwater.

2.2 DATA EVALUATION PROCESS

The following guidelines for data evaluation were used to produce the data summaries for each groundwater unit. These approaches are consistent with current U.S. EPA guidelines (U.S. EPA, 1989).

- If a chemical was not positively identified in any sample from a given medium, either because it was not found at a concentration exceeding the sample detection limit or due to blank contamination, it was not addressed for that medium.
- All "J"-qualified data (i.e., estimated concentrations) were used in the quantitative analysis in the same manner as unqualified positive data.
- If a chemical was reported as a non-detect in a particular sample, but was detected in the medium as a whole, one-half of the sample quantitation limit was used as a "proxy" concentration for the chemical in that sample when calculating the mean and 95% upper confidence limit (UCL) concentrations.
- Duplicate sample results from the same sampling round were treated as one data point in summarizing the analytical results. Positive duplicate values were averaged to obtain the single data point; however, if the chemical was detected in one of the duplicates but not the other, the detected concentration was used.
- If a chemical was detected in an investigative sample and was also detected in a field, trip, or laboratory blank associated with that sample, then the sample concentration was considered to be positive only if it exceeded 5 times the blank concentration (or 10 times for the common laboratory contaminants acetone, methylene chloride, toluene, and 2-butanone).
- For the shallow groundwater unit, results for the same well from different sampling rounds were treated as distinct data points.

Tables 2-1 and 2-2 present data summaries for the upper and lower units, respectively. These summaries include the frequency of detection, the range of detected concentrations, the arithmetic mean concentration, and the 95 percent UCL of the mean.

Table 2-1

Data Summary for the Shallow Groundwater Unit
EKCO Housewares
Massillon, Ohio
(All Concentrations in μg/L)

Chemical	Frequency of Detection	Range of Detected Concentrations	Mean Concentration[a]	Upper 95 Percent Confidence Limit Concentration[a]	Exposure Point Concentration	Maximum Contaminant Level[b]
Acetone	3 / 32	4.4 - 17	3.27	4.25	4.25	NE
Benzene	2 / 32	0.15 - 4	1.1	1.45	1.45	5
2-Butanone	1 / 32	2.6	2.22	2.6	2.6	NE
Carbon disulfide	2 / 32	1 - 1.1	1.12	1.1	1.1	NE
Chloroethane	3 / 32	2 - 6.4	2.51	3.19	3.19	NE
Chloroform	3 / 32	1 - 10	1.4	1.99	1.99	100
1,1-Dichloroethane	27 / 32	1 - 2,200	279	451	451	NE
1,2-Dichloroethane	4 / 32	3.7 - 73	5	9.24	9.24	5
1,1-Dichloroethene	15 / 32	1.5 - 1,900	109	220	220	7
1,2-Dichloroethene (total)	18 / 32	1 - 480	61.4	93.7	93.7	70[c]
Ethylbenzene	3 / 32	0.22 - 3	1.08	1.41	1.41	700
4-Methyl-2-pentanone	1 / 32	7	2.27	2.92	2.92	NE
Tetrachloroethene	4 / 32	0.86 - 55	4.29	7.71	7.71	5
Toluene	5 / 32	0.25 - 130	5.77	12.6	12.6	1,000
1,1,1-Trichloroethane	18 / 32	2.5 - 52,000	2,490	5,380	5,380	200
1,1,2-Trichloroethane	3 / 32	7.4 - 140	7.58	15.6	15.6	5
Trichloroethene	23 / 32	1 - 220,000	10,100	22,300	22,300	5
Vinyl chloride	12 / 32	4 - 150	18.2	28.4	28.4	2
Xylenes (total)	2 / 22	1.4 - 5	1.19	1.56	1.56	10,000

[a] Calculated using "proxy" concentrations for nondetects equal to 1/2 of the sample reporting limit.
[b] U.S. EPA Maximum Contaminant Level (MCL) (U.S. EPA, 1994b).
[c] Value is for *cis* isomer. (MCL for *trans* isomer is 100 μg/L.)
NE - An MCL has not been established for this compound.

TABLE 2-2

DATA SUMMARY FOR THE BEDROCK GROUNDWATER UNIT
EKCO HOUSEWARES
MASSILLON, OHIO
(All Concentrations in μg/L)

Chemical	Frequency of Detection	Range of Detected Concentrations	Mean Concentration[a]	Upper 95% Confidence Limit Concentration[a]	Exposure Point Concentration	Maximum Contaminant Level[b]
1,1-Dichloroethane	5 / 6	2 - 150	52.4	102	102	NE
1,1-Dichloroethene	4 / 6	1 - 56	13.4	31.3	31.3	7
1,2-Dichloroethene (total)	5 / 6	4 - 260	59.0	142	142	70[c]
1,1,1-Trichloroethane	4 / 6	5 - 1,200	216	613	613	200
Trichloroethene	6 / 6	5 - 430	98.7	234	234	5
Vinyl chloride	2 / 6	3.3 - 15	3.38	8.15	8.15	2

[a] Calculated using "proxy" concentrations for nondetects equal to 1/2 of the sample reporting limit.
[b] U.S. EPA Maximum Contaminant Level (MCL) (U.S. EPA, 1994b).
[c] Value is for *cis* isomer. (MCL for *trans* isomer is 100 μg/L.)
NE - An MCL has not been established for this compound.

2.3 CHEMICALS OF POTENTIAL CONCERN

The chemicals of potential concern in a risk assessment are those chemicals that are potentially site-related and whose data are of sufficient quality for use in the quantitative analysis. The VOC data for the wells and sampling events listed in Subsection 2.1 were evaluated and summarized according to the guidelines described in Subsection 2.2 above. All VOCs that were positively identified in each groundwater unit after the data evaluation were included as chemicals of potential concern for that unit. Well L-3 served as a background well for the study; however, no VOCs were detected in this well during the 1988, 1991, and 1992 sampling events. Tables 2-1 and 2-2 present the chemicals of potential concern for the upper and lower groundwater units, respectively.

2.4 EXPOSURE POINT CONCENTRATIONS

The exposure point concentration is the concentration of a chemical to which a receptor is expected to be exposed. The exposure point concentration for each chemical of concern in each groundwater unit was calculated as the lower of either the maximum detected concentration or the 95% UCL of the arithmetic mean concentration. The 95% UCL was calculated according to the following standard equation (Mendenhall and Sincich, 1988):

$$95\,\%\,\mathrm{UCL} = \bar{y} \pm t_{\alpha=0.05}\left(\frac{s}{\sqrt{n}}\right)$$

where:

$\bar{y}$ = sample mean
$t_{\alpha=0.05}$ = student's *t*-statistic based on (n-1) degrees of freedom
s = sample standard deviation
n = sample size

Exposure point concentrations for the chemicals of potential concern in each groundwater unit are listed in Tables 2-1 and 2-2.

2.5 REFERENCES

Mendenhall, W. and T. Sincich, 1988. *Statistics for the Engineering and Computer Sciences.* Dellen Publishing Company.

EPA (United States Environmental Protection Agency), 1989. *Risk Assessment Guidance for Superfund: Volume I, Human Health Evaluation Manual, Part A, Interim Final.* Office of Solid Waste and Emergency Response. OSWER Directive 9285.7-01a.

EPA (United States Environmental Protection Agency), 1994a. Letter to P. McDonald (American Home Products, Madison, NJ 07940) from S. Averill (U.S. EPA Region V, RCRA Enforcement Branch, Chicago, IL 60604-3590). 22 June 1994.

EPA (United States Environmental Protection Agency), 1994b. *Drinking Water Regulations and Health Advisories.* Office of Water.

SECTION 3
EXPOSURE ASSESSMENT

The purpose of the exposure assessment is to estimate the magnitude of human exposure to the chemicals of potential concern at the EKCO facility. The results of the exposure assessment are combined with chemical-specific toxicity information to quantitatively estimate the human health risks associated with chemical exposure (EPA, 1989a).

The identification of actual or potential pathways through which human receptors could be exposed to chemicals in the groundwater at the EKCO facility consists of an evaluation of the contaminated environmental media and a characterization of the potentially exposed populations. After the exposure pathways have been identified, daily intakes (doses) of the chemicals of potential concern can be quantified using standard exposure algorithms (EPA, 1989a).

3.1 PATHWAYS OF EXPOSURE

An exposure pathway generally consists of four elements: (1) a source and mechanism of contaminant release, (2) a retention or transport medium, (3) a point of potential human contact with the contaminated medium (referred to as the exposure point), and (4) an exposure route (i.e., ingestion, inhalation, or dermal contact) at the exposure point (EPA, 1989a).

3.1.1 Contaminant Sources and Migration

Site investigations at the EKCO facility have confirmed the presence of VOCs in two water bearing units: the upper (shallow/intermediate) unit and the lower (bedrock) unit. Groundwater within the upper unit typically occurs under unconfined to semiconfined conditions; groundwater flow in this unit is toward wells W-1 and W-10. Groundwater in the lower unit is semi-confined by overlying shale; the direction of groundwater flow in this unit is also toward wells W-1 and W-10.

Chemicals detected in these groundwater units could migrate off site or persist on site. The migration of chemicals in groundwater is generally slower than groundwater migration itself, due to retardation of chemical movement resulting from adsorption to soils. This effect may be negligible for highly mobile chemicals (low adsorption potential) but could be extremely significant for the relatively immobile chemicals (high adsorption potential). In addition, chemicals disperse laterally as they are transported downgradient, resulting in dilution as contaminated water mixes with laterally adjacent, less contaminated water.

Chemicals in the groundwater could be transported into the air through volatilization or within the groundwater into off-site downgradient areas. Chemicals in groundwater can volatilize to the soil pore spaces and reach the surface of the soil and the surrounding air by diffusion. Volatilization from a water table aquifer is affected by depth to the water table and the moisture content of the unsaturated soil column. Volatilization from groundwater is most rapid if the water table is shallow. At the EKCO facility, the top of shallow groundwater unit averages about 15 feet below land surface. Volatilization to the surface from this aquifer is not expected because the distance to the land surface would greatly limit diffusion. In addition, rain and other precipitation events on the surface would result in water percolation downward through the soil. As water infiltrated through the soil, any chemicals in the air-filled soil pore spaces would become solubilized and be transported downward with the leachate back to the groundwater. However, if on-site groundwater were pumped to the surface for use, chemicals could volatilize directly to the air. Contaminated groundwater used as a domestic or nondomestic water supply could result in a significant loss of contaminants through volatilization to the atmosphere. Through agitation, heating, or other mechanical handling, VOCs would be expected to volatilize rapidly. Fate processes other than adsorption, dispersion, and volatilization (e.g., bioaccumulation, biodegradation, photodegradation) are expected to be insignificant in groundwater.

3.1.2 Receptors and Exposure Routes

The primary exposure pathway at the EKCO facility is the groundwater pathway. The EKCO facility is an operating manufacturing facility that produces nonstick bakeware. The

area surrounding the facility is largely urban and industrial, although land to the northwest is more rural with a large proportion of open space. Ohio Water Service (OWS) production wells are located 2,000 feet northeast of the EKCO property and are screened in the deep sand and gravel glacial valley. These wells provide water to the City of Massillon, Ohio.

Currently, groundwater on the EKCO property is used for production purposes at the facility. Workers at the site do not use (or plan to use in the future) this water for drinking or showering purposes. Presently, groundwater at the facility is pumped, air-stripped and then used for non-contact cooling. Therefore, workers are not exposed to the impacted groundwater, and were not evaluated in this risk assessment. Groundwater in the upper unit flows toward the production wells. Due to the operation of these wells, the shallow unit is dewatered beneath a large portion of the property. An intermediate unit exists only beneath the eastern portion of the property. A significant bedrock drawdown cone induced by the pumping of these production wells exists beneath the facility. Based on the current status of the EKCO facility, the only individuals expected to be exposed to site chemicals would be future on-site residents who use groundwater as their primary water supply.

In this risk assessment, on-site wells were evaluated for groundwater use by hypothetical future residents, assuming shutdown of the production wells and unrestricted future use of the property. Future residential exposure was evaluated for an adult and a small child (1-6 years) based on the fact that although the majority of a lifetime is spent as an adult, children are most sensitive to the effects of chemical exposure. Both shallow and bedrock well data were used to evaluate risks from drinking water ingestion, noningestion household uses (inhalation of and dermal contact with VOCs in tap water) and home garden watering uses (i.e., irrigation) by on-site future residents. It is noted that the upper unit has a very low-to-negligible probability as drinking water sources, since the yield from these units is not sufficient to support drinking water use (see Appendix C). Moreover, current off-site residences obtain drinking water from the bedrock or deep glacial sand and gravel aquifers. This issue is discussed in the Uncertainty Analysis (Section 6).

3.2 QUANTIFICATION OF EXPOSURE

The degree of receptor exposure that occurs through each exposure pathway is determined by behavioral, chemical, and physiological factors. Behavioral factors affecting exposure would include the amount of time spent on site, the activities engaged in while on site, and the amount and type of clothing worn. Chemical factors affecting the degree of exposure would include the extent to which a chemical is absorbed through the skin (i.e., the absorption efficiency) or is volatilized to the air. Physiological factors affecting exposure would include the ability of the body to metabolize and eliminate the chemical(s). To quantify exposures in the risk assessment process, it is necessary to make assumptions concerning these factors in the absence of specific, detailed information. These assumptions are represented by a series of exposure parameters that quantify the magnitude, frequency, and duration of the exposure.

EPA has developed exposure algorithms for use in calculating chemical intakes (or doses) through specific exposure pathways and routes (EPA, 1989a). These algorithms combine the chemical exposure point concentrations with pathway- and route-specific parameters to produce daily chemical intakes in terms of the milligrams of chemical taken into the body per kilogram of body weight per day (mg/kg-day). For the EKCO facility, daily chemical intakes were calculated separately for carcinogenic and noncarcinogenic health effects under reasonable maximum exposure (RME) conditions, in accordance with EPA guidance (EPA, 1989a). The RME is the highest exposure that is reasonably expected to occur at a site.

The following paragraphs discuss the exposure algorithms that were used to calculate chemical intakes in this study.

3.2.1 Groundwater Ingestion

Daily chemical intakes through groundwater ingestion for adults and children were calculated using the equation shown in Table 3-1. The values for the groundwater ingestion exposure parameters that were used are also shown in Table 3-1.

The ingestion rate for potable water is established at 2 L/day for an adult (EPA, 1991a) and 1 L/day for a child (EPA, 1989a; 1989b) for a residential land use. These amounts include water consumed in the form of other beverages and the ingestion of foods prepared in or with water.

The exposure frequency (EF) for the potential resident (i.e., 350 days/year), is the recommended residential exposure frequency (EPA, 1991a). This value assumes that 15 days per year are spent away from home.

The exposure duration (ED) for an adult resident was assumed to be a maximum of 24 years. The ED for the child resident was assumed to be a maximum of 6 years. These values are based on the 90th percentile total number of years (i.e., 30) at one residence (EPA, 1989a), assuming conservatively that the initial 6 years of exposure occur during early childhood when the sensitivity to chemical exposure is the greatest.

The value for body weight is the average body weight over the exposure period. An average body weight is used because when combined with other variable values in the intake equation, it is believed to result in the reasonable maximum exposure. Incorporating a higher body weight with the same intake rate would result in lower exposure than the reasonable maximum. In addition, using an average body weight rather than a reasonable maximum is recommended because the available toxicity values are based on average body weight. The recommended average body weight for an 18- to 75-year old adult is 70 kg; the recommended average body weight for a 1- to 6-year-old child is 15 kg (EPA, 1991a).

TABLE 3-1

EXPOSURE ALGORITHM AND ASSUMPTIONS FOR POTENTIAL INGESTION OF CHEMICALS IN GROUNDWATER
EKCO HOUSEWARES
MASSILLON, OHIO

EXPOSURE ALGORITHM

$$\text{Intake from Water Ingestion (mg/kg-day)} = \frac{CW \times IR \times CF \times EF \times ED}{BW \times AT}$$

where:

CW	=	Chemical concentration in water (μg/L)[a]
IR	=	Water ingestion rate (L/day)
CF	=	Conversion factor (10^{-3} mg/μg)
EF	=	Exposure frequency (days/year)
ED	=	Exposure duration (years)
BW	=	Body weight (kg)
AT	=	Averaging time (days)

EXPOSURE ASSUMPTIONS [b]

Variable	Receptor Group	
	Resident	
	Child	Adult
IR (L/day)	1	2
CF (mg/μg)	1E-3	1E-3
EF (days/year)	350	350
ED (years)[c]	6	24
BW (kg)	15	70
AT-Noncancer (days)	2,190	8,760
AT-Cancer (days)	25,550	25,550

[a] See Tables 2-1 and 2-2 for chemical-specific exposure point concentrations.
[b] Default exposure assumptions from U.S. EPA (1991a), unless indicated.
[c] Based on 95th percentile time at one residence (U.S. EPA, 1989a), assuming 20% of time is as a child (6 years out of 30 years).

The averaging time (AT) is the period over which the exposure is averaged. For noncarcinogenic effects, AT is equal to the exposure duration (ED). For carcinogenic effects, AT is equal to the average lifetime for an individual in the U.S., which was assumed to be 70 years (EPA, 1991a).

The estimated daily chemical intakes that result from groundwater ingestion are presented in Appendix B, Tables B-1 and B-5.

3.2.2 Household Noningestion Uses of Groundwater (Inhalation of VOCs)

Household water is used for noningestion purposes such as showering, dish washing, laundering, cooking, and bathing. Volatile contaminants in the water may enter the indoor air through these uses, exposing receptors to volatilized contaminants through inhalation. Table 3-2 presents the equation and exposure parameters used to calculate daily chemical doses via inhalation of volatiles from groundwater (upper and lower units). This equation contains a volatilization constant (K) which has an upper bound value of 5E-01 L/m^3. The volatilization constant was derived by Andelman (as presented in EPA, 1991b). It defines the relationship between the concentration of a contaminant in household water and the average concentration of the volatilized contaminant in household air. The constant is based on the following assumptions:

- volume of water used by a hypothetical family of four is 720 L/day;
- volume of the hypothetical residential dwelling is 150,000 L;
- air exchange rate is 0.25 m^3/hr;
- an average of 50% of the chemical concentration in groundwater is transferred into household air from all water uses.

According to EPA (1991b), VOCs are defined as organic chemicals with a molecular weight of less than 200 g/mol, and a Henry's Law Constant of greater than 1E-05 atm-m^3/mol.

TABLE 3-2
EXPOSURE ALGORITHM AND ASSUMPTIONS FOR POTENTIAL NONINGESTION (INHALATION) HOUSEHOLD USES OF GROUNDWATER
EKCO HOUSEWARES
MASSILLON, OHIO

EXPOSURE ALGORITHM

$$\text{Inhalation from Household Water Use (mg/k-d)} = \frac{CW \times K \times IR \times EF \times ED}{BW \times AT}$$

where:

CW	=	Chemical concentration in water (μg/L)[a]
K	=	Volatilization Factor (L/m^3)
IR	=	Daily indoor inhalation rate (m^3/day)
CF	=	Conversion factor (10^{-3} mg/μg)
EF	=	Exposure frequency (days/year)
ED	=	Exposure duration (years)
BW	=	Body weight (kg)
AT	=	Averaging time (days)

EXPOSURE ASSUMPTIONS[b]

Variable	Receptor Group	
	Resident	
	Child	Adult
K L/m^3)[c]	5E-1	5E-1
IR (m^3/day)[c] CF (mg/μg)	15 1E-3	15 1E-3
EF (days/year)	350	350
ED (years)[c]	6	24
BW (kg)	15	70
AT-Noncancer (days)	2,190	8,760
AT-Cancer (days)	25,550	25,550

[a] See Tables 2-1 and 2-2 for chemical-specific exposure point concentrations for upper and lower units, respectively.
[b] Default exposure assumptions from U.S. EPA (1991a), unless indicated.
[c] Default values based on inhalation equation derived for household water use (EPA, 1991b). The constant K is actually unitless, but incorporate a conversion factor to estimate air concentration in mg/m^3.
[d] Based on 95th percentile time at one residence (U.S. EPA, 1989a), assuming 20% of time is as a child (6 years out of 30 years).

An inhalation rate (IR) of 15 m^3/day has been found to represent a reasonable upperbound inhalation rate for daily indoor residential activities (EPA, 1991a). The values used for the remaining exposure parameters in the inhalation equation (i.e., EF, ED, BW, and AT) were discussed in Subsection 3.2.1.

The estimated daily chemical intakes that result from inhalation of volatiles are presented in Appendix B, Tables B-3 and B-7.

3.2.3 Dermal Absorption of VOCs While Showering/Bathing

For most contaminants, dermal contact with water during bathing or swimming will generally pose less threat than direct consumption of water, since contact times are relatively brief and most chemicals do not readily penetrate the skin when present at dilute levels in water (EPA, 1989b). In addition, VOCs have been shown to volatilize significantly during showering (Foster and Chrostowski, 1987). These observations suggest that the effective concentrations of VOCs in water available for dermal absorption will be relatively small (EPA, 1992). Nevertheless, the potential exposure by this pathway was estimated for future residential use.

Table 3-3 presents the equation used to calculate daily chemical intake via dermal absorption while bathing. The exposure input parameters used are detailed below the table. The surface area for the adult represents 100% of the maximum surface area (23,000 cm^2) for the male (Table 8-3; EPA, 1992). For the child, the 95th percentile value for total surface area was used (8,760 cm^2) (Table 8-4; EPA 1992). It was assumed that both the child and adult shower once daily for 15 minutes giving an exposure time (ET) of 0.25 hours per day for 350 days per year (EPA, 1992). The permeability constant (Kp) defines the rate of movement of a waterborne chemical through the skin. Chemical-specific permeability constants for the chemicals of concern were obtained from EPA (1992), and are presented in Table 3-4.

Table 3-3
Exposure Algorithm and Assumptions for Potential Dermal Absorption While Showering/Bathing
Ekco Housewares
Massillon, Ohio

$$\text{Dermal Absorption Dose from Surface Water (mg/kg-day)} = \frac{CW \times CF \times SA \times Kp \times ET \times EF \times ED}{BW \times AT}$$

Where:

CW	=	Chemical concentration in surface water (mg/L)
CF	=	Conversion factor (10^{-3} L/cm^3)
SA	=	Skin surface area available for contact (cm^2/day)
Kp	=	Dermal permeability constant (cm/hour)
ET	=	Exposure time (hours/day)
EF	=	Exposure frequency (days/year)
ED	=	Exposure duration (years)
BW	=	Body weight (kg)
AT	=	Averaging time (days)

Exposure Assumptions (child and adult on-site resident):

CW	=	95% UCL in upper and lower groundwater units.
SA	=	8,760 cm^2/day for the child resident (EPA, 1994).
	=	23,000 cm^2/day for the adult resident (EPA, 1994).
Kp	=	Chemical specific (see Table 3-4).
ET	=	0.25 hr/day (EPA, 1994).
EF	=	350 days/year (EPA, 1989).
ED	=	6 yrs for the child resident (EPA, 1991).
	=	24 yrs for the adult resident (EPA, 1991).
BW	=	15 kg for the child (EPA, 1991).
	=	70 kg for the adult (EPA, 1991).
AT	=	Exposure duration (years) x 365 days/year for evaluating noncancer risk.
	=	70 years x 365 days/year for evaluating cancer risk.

The values used for the remaining exposure parameters in the dermal absorption equation (i.e., EF, ED, BW, and AT) were discussed in Subsection 3.2.1.

The estimated daily chemical doses that result from dermal absorption from groundwater are presented in Appendix B, Tables B-2 and B-6.

3.2.4 Consumption of Home-Grown Produce

Exposure to site contaminants through the ingestion of garden vegetables and fruits irrigated with contaminated groundwater is a potential exposure route for future child and adult residents. This potential exposure route was evaluated for the shallow and bedrock groundwater units. Three general categories of garden produce were considered in this evaluation -- leafy vegetables (represented by lettuce), root vegetables (represented by carrots), and garden fruits (represented by tomatoes). The equation and assumptions used to estimate chemical intakes through the consumption of home-grown produce are presented in Table 3-5.

EPA (1991a) has recommended intake rates of 42 g/day for consumption of home-grown fruit and 80 g/day for adult consumption of home-grown vegetables. These values have been adjusted to reflect the amount of home-grown produce typically consumed as a proportion of total consumption (i.e, 30% for fruits and 40% for vegetables). The total consumption of fruits and vegetables by a child (1-6 years) was assumed to be 60% of the total consumption of fruits and vegetables by an adult. This assumption is based on data collected by USDA on the national average consumption rates per day for lettuce, tomatoes, and carrots (Pao et al., 1982).

For an adult, it was assumed that leafy vegetables and root vegetables comprise 45% and 55% of the total vegetable consumption, respectively. For a child, it was assumed that leafy vegetables and root vegetables comprise 35% and 65% of the total vegetable consumption, respectively. These assumptions were based on tomato, carrot, and lettuce consumption data for 19- to 34-year-old (male) and 3- to 5-year-old (male and female) individuals (Pao

Table 3-4

Dermal Permeability Coefficients for Chemicals of Concern at EKCO Housewares

Chemical	Groundwater Unit	Kp[a] (cm/hr)
Acetone	S	NA
Benzene	S	2.1E-02
Carbon disulfide	S	2.4E-02
Chloroethane	S	8.0E-03
Chloroform	S	8.9E-03
1,1-Dichloroethane	S,B	8.9E-03
1,2-Dichloroethane	S	5.3E-03
1,1-Dichloroethene	S,B	1.6E-02
1,2-Dichloroethene	S,B	1.0E-02
Ethylbenzene	S	7.4E-02
Methyl ethyl ketone	S	1.1E-03
4-Methyl-2-pentanone	S	3.3E-03
Tetrachloroethene	S	4.8E-02
Toluene	S	4.5E-02
1,1,1-Trichloroethane	S,B	1.7E-02
1,1,2-Trichloroethane	S	8.4E-03
Trichloroethene	S,B	1.6E-02
Vinyl chloride	S,B	7.3E-03
Xylene (m)	S	8.0E-02

NA = Not available
S = present in shallow unit
B = present in bedrock unit
[a]Kp value obtained from Table 5-7 (EPA, 1992)

TABLE 3-5
EXPOSURE ALGORITHM AND ASSUMPTIONS FOR POTENTIAL INGESTION OF CHEMICALS IN HOME-GROWN PRODUCE
EKCO HOUSEWARES
MASSILLON, OHIO

EXPOSURE ALGORITHM

$$\text{Intake from Home-Grown Produce (mg/kg-day)} = \frac{[(C_{lv} \times IR_{lv}) + (C_{gf} \times IR_{gf}) + (C_{rv} \times IR_{rv})] \times EF \times ED}{BW \times AT}$$

where:

C_{lv}	=	Chemical concentration in leafy vegetables (mg/kg)[a]
IR_{lv}	=	Ingestion rate for leafy vegetables (kg/day)
C_{gf}	=	Chemical concentration in garden fruits (mg/kg)[a]
IR_{gf}	=	Ingestion rate for garden fruits (kg/day)
C_{rv}	=	Chemical concentration in root vegetables (mg/kg)[a]
IR_{rv}	=	Ingestion rate for root vegetables (kg/day)
EF	=	Exposure frequency (days/year)
ED	=	Exposure duration (years)
BW	=	Body weight (kg)
AT	=	Averaging time (days)

EXPOSURE ASSUMPTIONS[b]

Variable	Receptor Group	
	Resident	
	Child	Adult
IR_{lv} (kg/day)[c]	0.017	0.036
IR_{gf} (kg/day)[c]	0.025	0.042
IR_{rv} (kg/day)[c]	0.031	0.044
EF (days/year)	350	350
ED (years)[d]	6	24
BW (kg)	15	70
AT-Noncancer (days)	2,190	8,760
AT-Cancer (days)	25,550	25,550

[a] See Table 3-4 for calculation of chemical concentrations in fruits and vegetables.
[b] Default exposure assumptions from U.S. EPA (1991b), unless indicated.
[c] Based on U.S. EPA (1991b) and Pao, et al (1982).
[d] Based on 95th percententile time at one residence (U.S. EPA, 1989a), assuming 20% of time is as a child (6 years out of 30 years).

The values used for the remaining exposure parameters in the produce ingestion equation (i.e., EF, ED, BW, and AT) were discussed in Subsection 3.2.1.

The estimated daily chemical intakes that result from ingestion of garden produce are presented in Appendix B.

Concentrations of chemicals in garden produce were not measured. Rather, chemical concentrations in garden fruits and vegetables were estimated based on the assumption that the plants accumulate chemicals from soil that has been irrigated with contaminated groundwater from the shallow or bedrock units.

The chemical concentrations in the edible plant portions were calculated as follows:

$$\text{Chemical Concentration in Produce (mg/kg)} = CS \times PUF$$

where:

CS = Chemical concentration in soil (mg/kg).
PUF = Plant uptake factor (unitless).

The plant uptake factor relates the chemical concentration in the plant to the chemical concentration in the soil under equilibrium conditions. Although plants take up chemicals from the soil solution, uptake factors are generally derived for soil solids. To estimate the chemical concentration in soil resulting from waterings of gardens, the shallow groundwater chemical concentration was multiplied by the chemical-specific soil-water partition coefficient (K_d). The soil-water partition coefficient relates the chemical concentration adsorbed to the solid phase to the chemical concentration in the soil solution. If a K_d value was not available for a chemical, it was estimated from the organic-carbon partition coefficient (K_{oc}) and the soil organic carbon content (f_{oc}). The concentrations of VOCs in groundwater were assumed to remain constant over time; loss of VOCs due to volatilization to the atmosphere was not considered in estimating soil concentrations.

Two approaches were used to determine plant uptake factors. One approach was used for leafy vegetables and garden fruits, and the other was used for root vegetables. These approaches are discussed below.

3.2.3.1 Uptake Factors for Leafy Vegetables and Garden Fruits

The uptake factors for VOCs in leafy vegetables and garden fruits were derived from the octanol-water partition coefficient for each chemical, applying the following relationship from Travis and Arms (1988):

$$\log B = 1.588 - 0.578 \log K_{ow}$$

where:

B = Bioconcentration factor for vegetation: the ratio of the chemical concentration in above-ground plant parts (mg chemical per kg of dry plant) to the chemical concentration in soil (mg chemical per kg of dry soil).

Log K_{ow} = Log of the octanol-water partition coefficient.

The uptake factor was then calculated by multiplying B by the percent dry weight of the plant:

$$PUF = B \times \% \text{ Dry Weight}$$

Since vegetable/fruit ingestion rates are expressed in terms of wet plant weight, chemical concentrations calculated using the Travis and Arms equation must be converted from a dry weight to a wet weight basis using the plant moisture content. Leafy vegetables and garden fruits typically have a water content of 95 to 96 percent (Baes et al., 1984). A water content of 95 percent was used in this analysis, which is equivalent to 5 percent dry weight (0.05). It is important to note that the Travis and Arms equation is based on data for 29 chemicals, each with a log K_{ow} value falling in the range from 1.15 to 6.89; the use of this equation may be inappropriate for chemicals with values that fall outside this range.

3.2.3.2 Uptake Factors for Root Vegetables

Uptake factors for root vegetables were derived based on the work of Briggs et al. (1982). Briggs studied the uptake of organic chemicals from solution by barley shoots and established the following relationship between the root concentration factor (RCF) and the K_{ow} for the organics tested:

$$\log (RCF - 0.82) = 0.77 \log K_{ow} - 1.52$$

where:

RCF = C_{root}/C_{soln}
C_{root} = Chemical concentration in the root (mg/kg).
C_{soln} = Chemical concentration in solution (mg/L).

The chemical distribution in the soil and water phases can be described as:

$$C_{soil}/C_{soln} = K_{oc} \times f_{oc}$$

The plant uptake factor for root vegetables (RUF) for each compound can be determined from the RCF, given the following relationship:

$$RUF = \frac{C_{root}/C_{soln}}{C_{soil}/C_{soln}} = \frac{C_{root}}{C_{soil}} = \frac{RCF}{K_{oc} \times f_{oc}}$$

where:

C_{root} = Concentration in root (mg/kg).

C_{soil} = Concentration in soil (mg/kg).

C_{soln} = Concentration in solution (mg/L).

K_{oc} = Organic carbon partition coefficient.

f_{oc} = Fraction of organic carbon in soil.

RCF = Root concentration factor, or the ratio of the root concentration to the solution concentration.

The estimated chemical concentrations in leafy vegetables, garden fruits, and root vegetables are presented in Tables 3-6 and 3-7, along with the chemical-specific parameters used in this derivation.

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Table 3-6

Estimation of Chemical Concentrations in Garden Produce
Upper Unit

Chemical	Groundwater[a] Concentration (μg/L)	Octanol-Water Partition Coefficient (log K_{ow})	Organic Carbon Partition Coefficient (log K_{oc})	Soil-Water Partition Coefficient (K_d)	Root Vegetables		Leafy Vegetables/Garden Fruits		
					RCF (L/kg)	Concentration (mg/kg)	B	PUF	Concentration (mg/kg)
1,1-Dichloroethane	451	1.78	1.48	0.60	1.53	6.90E-01	3.62	0.18	4.94E-02
1,1-Dichloroethene	220	1.92	1.81	1.29	1.73	3.80E-01	3.01	0.15	4.27E-02
1,2-Dichloroethene (total)	93.7	2.09	1.77	1.18	2.05	1.92E-01	2.40	0.12	1.32E-02
1,1,1-Trichloroethane	5380	2.38	2.11	2.58	2.87	1.55E+01	1.63	0.08	1.13E+00
Trichloroethene	22300	2.89	1.99	1.95	5.89	1.31E+02	0.83	0.04	1.80E+00
Vinyl chloride	28.4	0.6	0.39	0.05	0.91	2.58E-02	17.43	0.87	1.21E-03
Chloroethane	3.19	1.43	0.51	0.06	1.20	3.83E-03	5.77	0.29	5.96E-05
Acetone	4.25	-0.24	-0.43	0.01	0.84	3.57E-03	53.30	2.66	8.42E-05
1,2-Dichloroethane	9.24	1.46	1.22	0.33	1.22	1.13E-02	5.55	0.28	8.51E-04
2-Butanone	2.6	0.28	0.09	0.02	0.87	2.26E-04	26.68	1.33	8.53E-05
1,1,2-Trichloroethane	15.61	2.18	1.75	1.12	2.26	3.53E-02	2.13	0.11	1.87E-03
Tetrachloroethene	7.71	2.61	2.44	5.51	3.91	3.01E-02	1.20	0.06	2.55E-03
Toluene	12.6	2.62	2.12	2.64	3.96	4.99E-01	1.18	0.06	1.97E-03
Ethylbenzene	1.41	3.08	2.25	3.56	7.93	1.12E-03	0.64	0.03	1.61E-05

Table 3-6

Estimation of Chemical Concentrations in Garden Produce
Upper Unit

Chemical	Groundwater[a] Concentration ($\mu g/L$)	Octanol-Water Partition Coefficient (log K_{ow})	Organic Carbon Partition Coefficient (log K_{oc})	Soil-Water Partition Coefficient (K_d)	Root Vegetables		Leafy Vegetables/Garden Fruits		
					RCF (L/kg)	Concentration (mg/kg)	B	PUF	Concentration (mg/kg)
Benzene	1.45	2.04	1.91	1.63	1.94	2.82E-03	2.56	0.13	3.02E-04
Xylenes (total)	1.56	3.1	2.81	12.91	8.18	1.28E-03	0.63	0.03	6.30E-04
Carbon disulfide	1.1	2.03	2.47	5.90	1.92	2.12E-04	2.60	0.13	8.43E-04
Chloroform	1.99	1.94	1.64	0.87	1.76	3.51E-03	2.93	0.15	2.54E-04
4-Methyl-2-pentanone	2.92	1.09	0.79	0.12	1.03	3.00E-03	9.08	0.45	1.63E-04

[a] Exposure point concentrations for upper unit (See Table 2-1)

$K_d = K_{oc} \times f_{oc}$ (f_{oc} assumed to be 0.02)
log (RCF - 0.82) = (0.77 log K_{ow}) - 1.52 (Briggs, et al, 1982)
log B = 1.588 - (0.578 log K_{ow}) (Travis and Arms, 1988)
PUF = B x % dry weight

Table 3-7

Estimation of Chemical Concentrations in Garden Produce
Lower Unit
EKCO Housewares
Massillon, Ohio

Chemical	Groundwater Concentration[a] (µg/L)	Octanol-Water Partition Coefficient[b] (log K_{ow})	Organic Carbon Partition Coefficient[b] (log K_{oc})	Soil-Water Partition Coefficient (K_d)	Root Vegetables		Leafy Vegetables/Garden Fruits		
					RCF (L/kg)	Concentration (mg/kg)	B	PUF	Concentration (mg/kg)
1,1-Dichloroethane	102	1.78	1.48	0.60	1.53	1.55E-01	3.62	0.18	1.11E-02
1,1-Dichloroethene	31.3	1.92	1.81	1.29	1.73	5.40E-02	3.01	0.15	6.07E-03
1,2-Dichloroethene (total)	142	2.09	1.77	1.18	2.05	2.92E-01	2.40	0.12	2.01E-02
1,1,1-Trichloroethane	613	2.38	2.11	2.58	2.87	1.76E+00	1.63	0.08	1.29E-01
Trichloroethene	234	2.89	1.99	1.95	5.89	1.38E+00	0.83	0.04	1.89E-02
Vinyl chloride	8.15	0.6	0.39	0.05	0.91	7.40E-03	17.43	0.87	3.49E-04

[a] Exposure point concentrations for lower unit (see Table 2-2).
[b] Values from Montgomery and Welkom, 1991.
Calculation Notes:
$K_d = K_{oc} \times f_{oc}$ (f_{oc} assumed to be 0.02)
log (RCF - 0.82) = (0.77 log K_{ow}) - 1.52 (Briggs, et al, 1982)
log B = 1.588 - (0.578 log K_{ow}) (Travis and Arms, 1988)
PUF = B x % dry weight

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SECTION 4
TOXICITY ASSESSMENT

4.1 INTRODUCTION

The purpose of this section of the report is to explain how the toxicity criteria for the chemicals evaluated for the EKCO site are derived and used in this baseline risk assessment. Toxicity criteria are applied to the estimated doses for the potentially exposed human calculated in Section 3 to determine potential adverse health effects. Human health criteria (cancer slope factors and reference doses) are developed and approved for most chemicals by the EPA, and are described in the Integrated Risk Information System (IRIS), an EPA computerized database (IRIS, 1994). If not available through IRIS, data was obtained from the Health Effects Assessment Summary Tables (HEAST; EPA, 1994). For some chemicals not listed in IRIS or HEAST, the criteria were obtained through the Environmental Criteria Assessment Office (ECAO), as recommended by EPA (1989) in their risk assessment guidance.

In predicting potential human health risks, both cancer (carcinogenic) and noncancer (noncarcinogenic) health effects of a chemical must be considered. The potential for producing carcinogenic effects is limited to those substances shown to cause cancer in animals and/or humans. Excessive exposure to all substances, carcinogens and noncarcinogens, can produce adverse noncarcinogenic effects. Therefore, cancer slope factors (CSFs) are developed for those chemicals of concern classified as carcinogens, and reference doses (RfDs) are developed to express the noncancer effects for all chemicals of concern selected regardless of its carcinogenic classification.

Animal data are the most common source of toxicity information although human response data are preferred. In general, much higher doses of a chemical in animals are required to produce an equal toxic response in humans. General principles of extrapolation for carcinogens and noncarcinogens can be found in later subsections of this toxicity assessment.

The toxicity of a chemical depends on the dose, route of administration, duration and frequency of exposure, and the species evaluated. The term "toxicity" is a property of the chemical that causes varying degrees of morphological and/or biochemical tissue or organ damage as the dose increases. The lower a dose of chemical that produces a given adverse effect, the more toxic or potent the chemical is considered. Some chemicals may produce toxic effects ranging from respiratory/skin irritation to lethality after a single (acute) high dose. However, acute exposures are not usually the main focus of concern in the baseline risk assessment. Exposure for a continuous period of months or years (chronic) at low exposure levels are potentially more significant from a human health viewpoint.

The probability of occurrence and the severity of a chronic toxic effect also depend on the concentration of chemical present in various media (water, soil, air) as well as the amount that can be accumulated by a person (exposure dose) on or near the site. Chemicals are potentially capable of producing adverse effects through breathing (inhalation), ingestion by mouth (oral ingestion), or skin absorption (dermal contact). Some chemicals may produce toxicity only through one route. Others may cause toxicity through a combination of some or all routes. Consequently, each chemical is evaluated for toxicity by determining its potency through each exposure route.

Last of all, a given species (e.g., mouse, rat, dog, human) may exhibit different types or degrees of toxicity to a given dose of a chemical. These qualitative and quantitative species differences in toxic response are related to genetic and other physiological factors such as rates and amounts of:

- absorption by different routes.
- distribution to various organs and tissues.
- metabolism of the chemical by the liver.
- excretion by the kidneys or lungs.

Moreover, there may be interspecies differences in chemical sensitivity, i.e., the magnitude of damage to a given tissue or organ produced by the same amount of chemical may vary

in different species. Finally, some chemicals may affect entirely different organ systems in different species.

4.2 CARCINOGENS

4.2.1 Classification of Chemicals Inducing Cancer - Weight of Evidence

Carcinogens are evaluated in a two-phased approach by the EPA (Carcinogenic Risk Assessment Verification Endeavor; CRAVE). First, their weight of evidence for causing cancer is determined, and then their CSF is determined if sufficient data are available. Both human and animal cancer data are reviewed to determine the likelihood that a chemical is a human and/or animal carcinogen. These weight of evidence classifications are summarized in Table 4-1. Specific EPA classifications for the cancer-causing contaminants of concern detected at the EKCO site are presented in Table 4-2.

4.2.2 Potency of Cancer-Causing Chemicals

Following weight of evidence classification, the potency of the chemical at which cancer is thought to occur in humans is calculated. The carcinogenic potency of a chemical is defined as that dose producing cancer over a lifetime of exposure by a given exposure route. A CSF is used to express this potency.

CSFs are expressed either as risk per unit dose ($[mg/kg\text{-}day]^{-1}$) or risk per unit concentration ($[mg/L$ or $mg/m^3]^{-1}$). They represent values that quantitatively define the relationship between exposure dose and carcinogenic response for a given chemical. By definition, the CSF represents a plausible upper-bound estimate of the probability of a response per unit intake of a chemical during an entire average lifetime of exposure (70 years). The larger the CSF for a given carcinogen, the greater is the risk of cancer occurring at a specific exposure level. CSFs may be developed from controlled studies in laboratory animals or epidemiologic studies in humans. The most valid data set is used to determine the CSF. If animal data are used, a species is chosen that has the closest physiological response to humans. When no choice is obvious, the most sensitive species, or an average of several supportive data sets, is used.

Table 4-1

EPA Categorization of Carcinogens Based on Human and Animal Evidence

EPA Categorization of Carcinogens (EPA, 1986b)					
	Animal Evidence				
	Sufficient	Limited	Inadequate	No Data	No Evidence
Human Evidence					
Sufficient	A	A	A	A	A
Limited	B1	B1	B1	B1	B1
Inadequate	B2	C	D	D	D
No data	B2	C	D	D	E
No evidence	B2	C	D	D	E

Key:

Group A - Human carcinogen (sufficient evidence from epidemiological studies).

Group B1 - Probable human carcinogen (at least limited evidence of carcinogenicity to humans).

Group B2 - Probable human carcinogen (a combination of sufficient evidence in animals and inadequate data in humans).

Group C - Possible human carcinogen (limited evidence in animals in the absence of human data).

Group D - Not classified (inadequate animal and human data).

Group E - No evidence for carcinogenicity (no evidence for carcinogenicity in at least two adequate animal tests in different species, or in both epidemiological and animal studies).

Table 4-2

Oral and Inhalation Cancer Slope Factors
EKCO Housewares
Massillon, Ohio

Chemical	Weight-of-Evidence Classification	Oral Slope Factor (mg/kg-day)	Species/ Type of Cancer	Slope Factor Basis/ Source	Inhalation Slope Factor (mg/kg-day)	Species/ Type of Cancer	Slope Factor Basis/ Source
Benzene	A	2.9E-02	human/leukemia	occupational exposure/IRIS	2.9E-02	human/leukemia	oral slope factor/HEAST
Chloroform	B2	6.1E-03	rat/kidney	104-week drinking water study/IRIS	8.1E-02	mouse/liver	gavage/HEAST
1,1-Dichloroethane	C	ND	---	---/IRIS	ND	---	---/IRIS
1,2-Dichloroethane	B2	9.1E-02	rat/circulatory system	gavage/IRIS	9.1E-02	rat/circulatory system	oral slope factor/HEAST
1,1-Dichloroethene	C	6.0E-01	rat/adrenal	gavage/IRIS	1.2E+00	mouse/kidney	12-month inhalation study/HEAST
Tetrachloroethene	B2/C	5.2E-02	NA	NA/ECAO	2E-03	NA	NA/ECAO
1,1,2-Trichloroethane	C	5.7E-02	mouse/liver	gavage/IRIS	5.7E-02	mouse/liver	oral slope factor/HEAST
Trichloroethene	B2/C	1.1E-02	NA	NA/ECAO	6E-03	NA	NA/ECAO
Vinyl Chloride	A	1.9E+00	rat/lung,liver	1000-day dietary study/HEAST	3.0E-01	rat/liver	1-year inhalation study/HEAST

IRIS - Integrated Risk Information System
HEAST - Health Effects Assessment Summary Tables
ECAO - Environmental Criteria and Assessment Office
ND - Not determined
NA - Not available

In animal studies designed to evaluate cancer-causing potential, relatively high doses of the chemical are usually administered daily for the lifetime of the animal (e.g., rat = 2 years). These daily doses are usually close to those producing noncarcinogenic toxicity. Cancer formation is more likely to be induced at these high doses in small groups of animals. Therefore, cancer effects occurring at higher animal doses must be extrapolated downward and consequently, the risk determined for a given carcinogen is likely to be a plausible upper limit. The actual (absolute) risk of cancer is unknown, but is likely to be considerably lower than the predicted (relative) risk, and may even be as low as zero (EPA, 1989). Moreover, in contrast to noncarcinogens, where it is believed that a safe dose exists below a threshold dose for toxicity, it is assumed that any dose of a carcinogen (however low) may cause changes in a single cell that could result in uncontrolled cell division, eventually leading to cancer. It has been argued that at low doses, cells may have the ability to detoxify carcinogens or repair chemical-induced cellular damage. Although it is important to recognize the possibility that some carcinogens may have a threshold for cancer-causing effects, it is assumed that no threshold exists when estimating cancer risk for humans. That is, it is conservatively assumed there is no dose of a carcinogen that is risk free. Figure 4-1 illustrates the "no-threshold" concept for carcinogens.

4.2.3 Route of Entry Into The Body

The carcinogenic potency of a substance depends on its route of entry into the body (e.g., ingestion, inhalation or dermal contact) and CSFs are, therefore, developed accordingly. In some cases, a carcinogen may produce tumors only at or near a specific route of entry (e.g., nasal passages) and may not be carcinogenic through other exposure routes. Table 4-2 presents the CSFs by oral ingestion and inhalation for the carcinogens of concern at the EKCO facility. Dermal CSFs are presented in Table 4-4.

4.2.3.1 Oral Ingestion Route

Oral slope factors are used to evaluate the risk from exposure to potential carcinogens through oral exposure pathways such as the incidental ingestion of soil and sediment, and the ingestion of groundwater (drinking water).

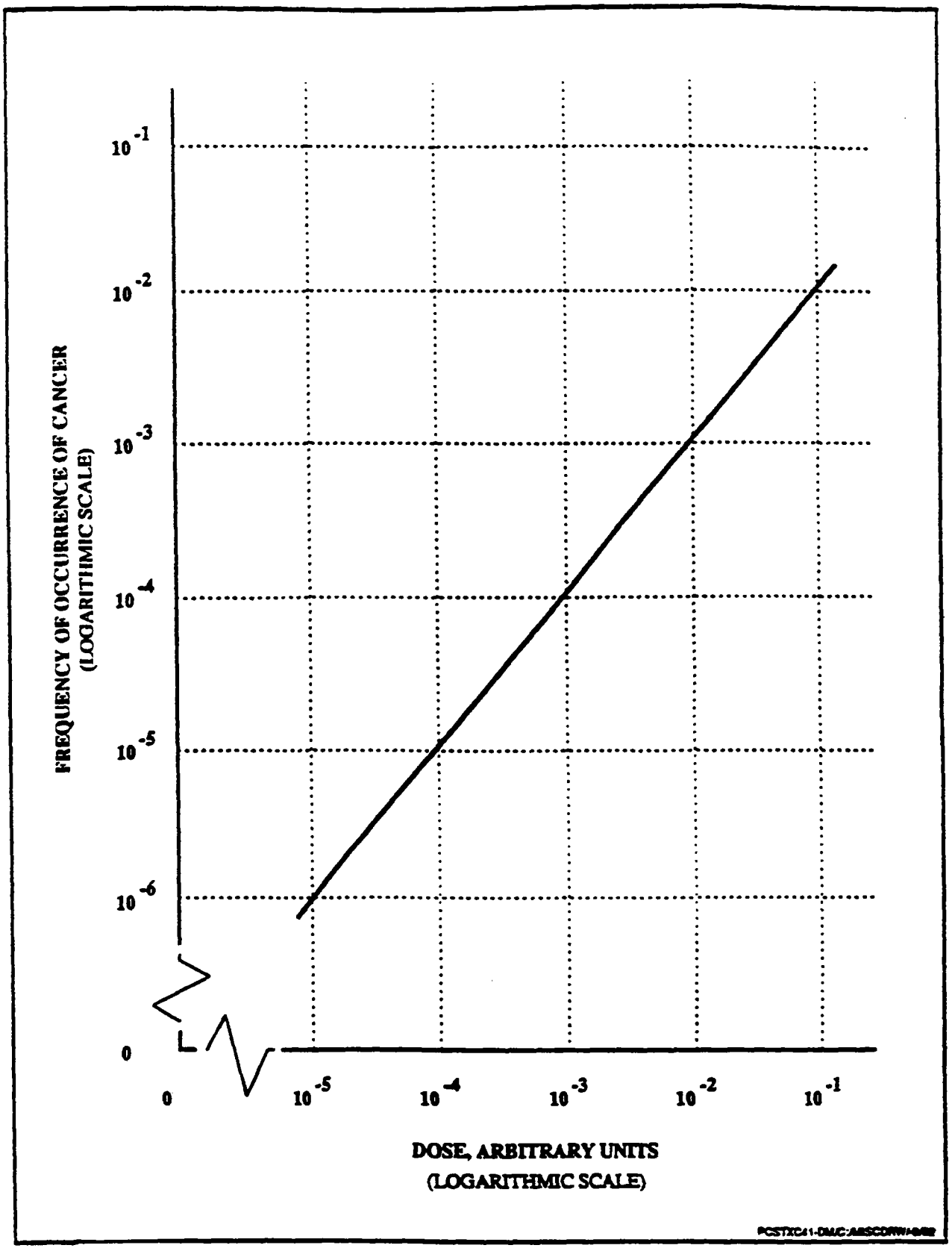

FIGURE 4-1 HYPOTHETICAL DOSE-RESPONSE CURVE FOR A "NO THRESHOLD" OR CARCINOGENIC CHEMICAL

4.2.3.2 Inhalation Route

Inhalation slope factors are used to evaluate the risk from exposure to potential carcinogens through pathways such as the inhalation of volatile chemicals from groundwater while showering. In the absence of an inhalation slope factor, oral slope factors, if available for a chemical, were used.

4.2.3.3 Dermal Absorption Route

Dermal slope factors are not available from the EPA, but it is assumed that chemicals which are carcinogenic orally could potentially produce cancer through dermal exposure. In the absence of dermal slope factors, the oral slope factor is divided by an appropriate gastrointestinal (GI) absorption factor (EPA, 1989). The GI absorption factor adjusts the orally administered dose upward for the amount absorbed since dermal exposure doses are expressed as "absorbed" doses. Oral and inhalation doses are usually expressed as "administered" doses.

Oral slope factors are normally developed from long-term studies where a substance is administered orally by gavage or diet to laboratory animals. Depending on the method and form in which the chemical is administered, the relative absorption of the chemical through the gastrointestinal tract (and therefore the relative absorption factor) may vary considerably. A conservative absorption factor of 80 percent for volatile organics was used. Metals, in general, tend to be poorly absorbed through the GI tract and therefore have the lowest absorption factor. The oral slope factor was divided by 0.8 (volatiles) to obtain the dermal slope factors.

4.3 NONCARCINOGENS

4.3.1 Estimates of Noncarcinogenic Potency and Toxicity

Toxicity criteria used to evaluate potential noncarcinogenic health effects are termed reference doses (RfDs). Unlike the approach used in evaluating carcinogenic risk, it is

assumed for noncarcinogenic chemicals that a threshold dose exists below which there is no potential for human toxicity.

The concept of the RfD was developed by the EPA to refer to the daily intake of a chemical to which an individual can be exposed without any expectation of noncarcinogenic effects (e.g., organ damage, biochemical alterations, birth defects) occurring during a given exposure duration.

The RfD is derived from a no-observed-adverse-effect level (NOAEL) or lowest-observed-adverse-effect level (LOAEL) obtained from human or animal studies. The criteria for choosing the appropriate NOAEL or LOAEL are discussed in the U.S. EPA's risk assessment guidance (EPA, 1989) and other documents (EPA, 1988). Rather than linearly extrapolating from high dose to low dose to obtain toxicity criteria as with carcinogens, RfDs are derived by applying standard uncertainty factors to the NOAEL or LOAEL, and in some cases, an additional modifying factor to account for professional assessment of scientific uncertainties in the available data (EPA, 1988).

A NOAEL is the highest dose of chemical at which no toxic effects are observed in any of the test subjects or animals. The study chosen to establish the NOAEL is based on the criterion that the measured toxic endpoint represents the most sensitive ("critical") target organ or tissue to the toxicity of that chemical (i.e., that target organ or tissue that shows evidence of damage at the lowest dose).

In contrast to a NOAEL, a LOAEL is the lowest dose at which any possible toxic effect is observed in any of the test subjects or animals. LOAELs are used to derive an RfD in the absence of a suitable NOAEL. Since it is possible that toxicity could occur at a lower dose than the reported LOAEL, an additional uncertainty factor is applied. Figure 4-2 illustrates the toxicity threshold concept as applied to a dose-response curve for a noncarcinogenic chemical.

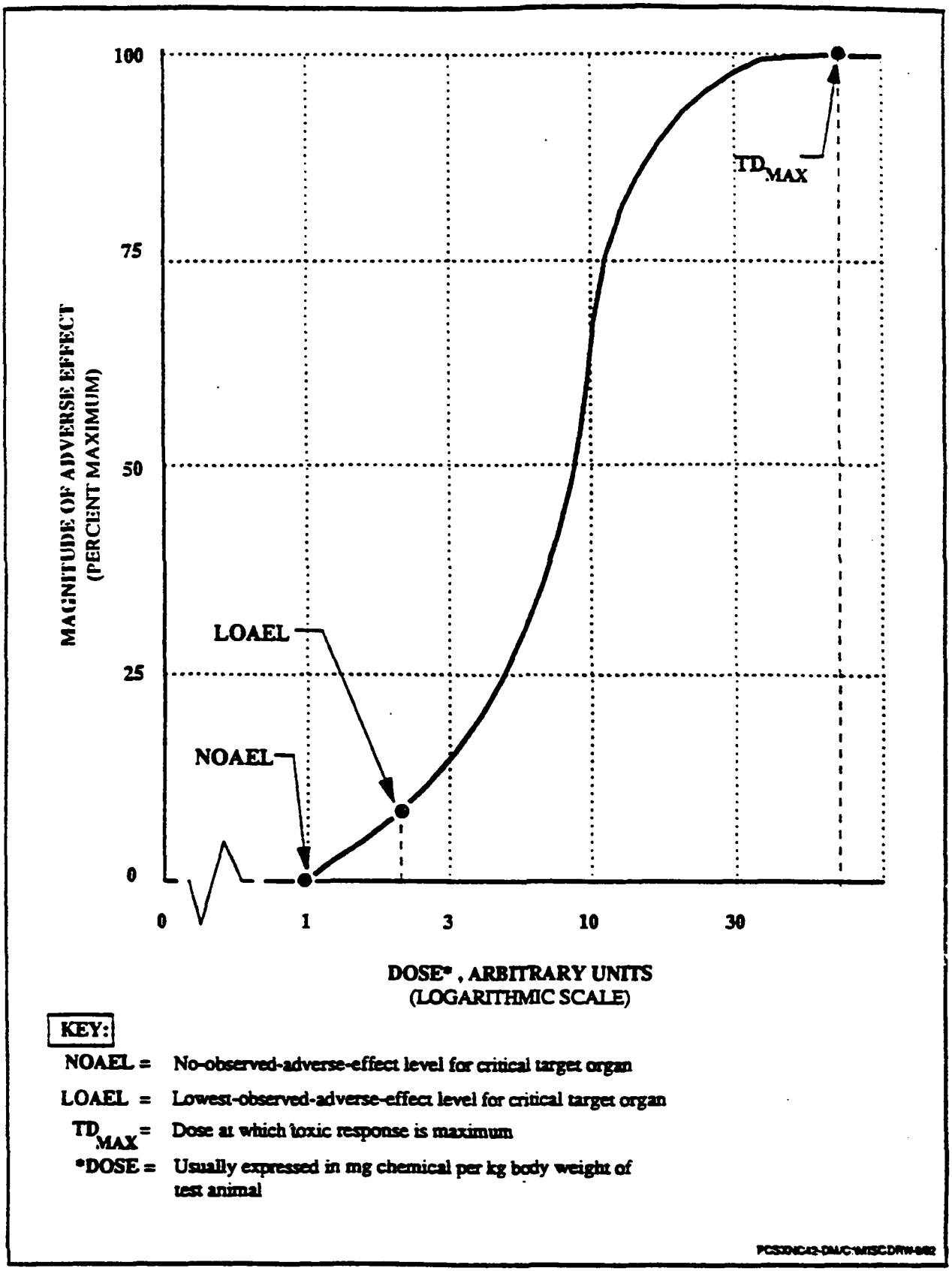

FIGURE 4-2 HYPOTHETICAL DOSE-RESPONSE CURVE FOR A "THRESHOLD" OR NONCARCINOGENIC CHEMICAL

4.3.2 Reference Doses

As with carcinogens, the route of exposure (e.g., ingestion, inhalation, dermal contact) of a noncarcinogen can determine the type and degree of toxicity. Table 4-3 presents the route-specific RfDs (oral ingestion and inhalation) and the critical toxic endpoints for the chemicals of concern at the EKCO Housewares facility. Dermal RFDs are presented in Table 4-4.

4.3.2.1 Oral Ingestion Route

Chronic oral RfDs were available for most chemicals of concern at the EKCO site. Chemicals for which no oral RfDs were available were benzene, 1,2-dichloroethane, and vinyl chloride. RfDs were not derived for these chemicals.

4.3.2.2 Inhalation Route

Toxicity criteria for inhaled noncarcinogens are now preferentially expressed in IRIS and HEAST as the reference concentration (RfC), rather than the traditional dose of mg/kg-day (RfD). EPA (1993) believes that it is more correct to express toxicity through inhalation based directly on air concentration than by determining internal dose based on pharmacokinetics, surface area adjustments, and the local respiratory effects of sensitizers and irritants. The RfC can usually be converted to an RfD by multiplying by $20m^3$/day and dividing by 70 kg. Since exposure doses are calculated as mg/kg-day, it is necessary to make this conversion for calculating the hazard quotient.

Oral RfDs were used as inhalation RfDs for volatile organic compounds if the latter were not available from IRIS (1994), HEAST (EPA, 1994) or ECAO. This assumes that an organic chemical producing noncarcinogenic effects by the oral route is likely to produce the same effect through systemic absorption following inhalation (while showering) and that the extent of systemic absorption is comparable through both exposure routes.

Table 4-3 (*Cont'd*)

Oral and Inhalation Chronic Reference Doses (RfDs)
EKCO Housewares
Massillon, Ohio

Chemical	Oral RfD (mg/kg-d)	Species/ Critical Effect	Oral RfD Basis/Source[k]	Uncertainty Factor	Inhalation RfD (mg/kg-day)	Species/ Critical Effect	Inhalation RfD Basis/Source[k]	Uncertainty Factor
4-Methyl-2-pentanone	8E-02	rat/kidney and liver effects	13-week gavage study/HEAST	3,000	2E-02	rat/kidney and liver effects	90-day inhalation study/HEAST	1,000
Tetrachloroethene	1E-02	mouse/hepatotoxicity	6-week gavage study/IRIS	1,000	1E-02	---	Oral RFD	---
Toluene	2E-01	rat/liver and kidney effects	13-week gavage study/IRIS	1,000	1.1E-01*	human/neurological effects	occupational exposure/IRIS	300
1,1,1-Trichloroethane	ND	---	---	---	1E+00	guinea pig/liver and lung effects	inhalation study/ECAO	NA
1,1,2-Trichloroethane	4E-03	mouse/clinical serum chemistry	subchronic drinking water study/IRIS	1,000	4E-03	---	Oral RFD	---
Trichloroethene	6E-03	mouse/liver effects	drinking water study/ECAO	3,000	1E-01	human/neurological effects	occupational exposure/ECAO	100
Vinyl chloride	ND	---	---	---	ND	---	---	---
Xylenes (total)	2E+00	rat/hyperactivity, decreased body weight, increased mortality	chronic gavage study/IRIS	100	2E+100	---	Oral RFD/	---

* Converted from reference concentration (RfC) through the following relationship: RfD (mg/kg-day) = RfC (mg/m^3) x 20 m^3/day x 1/(70 kg)
(20 m^3/day is a standard daily inhalation rate from RAGS Supplemental Guidance [U.S. EPA, 1991]).

IRIS - Integrated Risk Information System
HEAST - Health Effects Assessment Summary Tables
ECAO - Environmental Criteria and Assessment Office
ND - Not determined
NA - Not available

Table 4-3

Oral and Inhalation Chronic Reference Doses (Rfds)
EKCO Housewares
Massillon, Ohio

Chemical	Oral RfD (mg/kg-d)	Species/ Critical Effect	Oral RfD Basis/Source[k]	Uncertainty Factor	Inhalation RfD (mg/kg-day)	Species/ Critical Effect	Inhalation RfD Basis/Source[k]	Uncertainty Factor
Acetone	1.0E-01	rat/increased liver and kidney weight and nephrotoxicity	gavage/IRIS	1,000 (100)	1.0E-01	---	Oral RFD/	---
Benzene	ND	---	---	---	ND	---	---	---
2-Butanone	6E-01	rat/decreased fetal birth weight	multi-generation developmental study (drinking water)/IRIS	3,000	2.9E-01*	mouse/decreased fetal birth weight	developmental inhalation study/IRIS	3,000
Carbon disulfide	1E-01	rabbit/fetal toxicity, malformations	inhalation teratogenic study/IRIS	100	2.9E-03*	rat/fetal toxicity	inhalation study/HEAST	1,000
Chloroethane	ND	---	---	---	2.9E+00*	mouse/delayed fetal ossification	developmental inhalation study/IRIS	300
Chloroform	1.0E-02	dog/liver lesions	7.5 year oral study/IRIS	1,000	1.0E-02	---	Oral RFD/	---
1,1-Dichloroethane	1E-01	rat/no adverse effects	inhalation study/HEAST	1,000	1.0E-01	cat/kidney damage	13-week inhalation study/HEAST	1,000
1,2-Dichloroethane	ND	---	---	---	ND	---	---	---
1,1-Dichloroethene	9E-03	rat/hepatic lesions	chronic oral bioassay/IRIS	1,000	9E-03	---	Oral RFD/	---
1,2-Dichloroethene (total)	9E-03	rat/liver lesions	2-year drinking water study/HEAST	1,000	9E-03	---	Oral RFD/	---
Ethylbenzene	1E-01	rat/liver and kidney toxicity	subchronic to chronic oral bioassay/IRIS	1,000	2.9E-01*	rat, rabbit/ developmental toxicity	developmental inhalation studies/IRIS	300

Table 4-4

Dermal Cancer Slope Factors and Reference Doses
EKCO Housewares
Massillon, Ohio

Chemical	Oral CSF $(mg/kg\text{-}day)^{-1}$	Dermal CSF[a] $(mg/kg\text{-}day)^{-1}$	Oral RfD (mg/kg-day)	Dermal RfD[b] (mg/kg/day)
Acetone	NC	NC	1.0E-01	8E-02
Benzene	2.9E-02	3.6E-02	ND	ND
2-Butanone	NC	NC	6E-01	4.8E-01
Carbon disulfide	NC	NC	1E-01	8E-02
Chloroethane	NC	NC	ND	ND
Chloroform	6.1E-03	7.6E-03	1.0E-02	8E-03
1,1-Dichloroethane	ND	ND	1E-01	8E-02
1,2-Dichloroethane	9.1E-02	1.1E-01	ND	ND
1,1-Dichloroethene	6.0E-01	7.5E-01	9E-03	7.2E-03
1,2-Dichloroethene	NC	NC	9E-03	7.2E-03
Ethylbenzene	NC	NC	1E-01	8E-02
4-Methyl-2-pentanone	NC	NC	8E-02	6.4E-02
Tetrachloroethene	5.2E-02	6.5E-02	1E-02	8E-03
Toluene	NC	NC	2E-01	1.6E-01
1,1,1-Trichloroethane	NC	NC	ND	ND
1,1,2-Trichloroethane	5.7E-02	7.1E-02	4E-03	3.2E-03
Trichloroethene	1.1E-02	1.4E-02	6E-03	4.8E-03
Vinyl chloride	1.9E+00	2E+00	ND	ND
Xylenes (total)	NC	NC	2E+00	1.6E+00

NC - Not a carcinogen.
ND - Not determined.
[a] Oral CSF divided by 0.8 to obtain dermal CSF (80% GI absorption factor).
[b] Oral RfD multiplied by 0.8 to obtain dermal RfD (80% GI absorption factor).

4.3.2.3 Dermal Absorption Route

Chronic RfDs have been developed for the oral and inhalation routes, but not for the dermal route. The same criteria and GI absorption factors used for derivation of dermal slope factors were used to develop dermal RfDs for noncarcinogens. A chronic dermal RfD representing the absorbed amount of noncarcinogen was derived by multiplying the value used as the chronic oral RfD by the appropriate GI absorption factor. The GI absorption factor used was 0.8 (volatile organics).

4.3.3 Other Issues Pertaining to Noncarcinogenic Effects

Only chronic RfDs, which are developed to evaluate potential toxicity at greater than seven years of exposure, are presented in Table 4-3 and were used in estimating both childhood and adult noncarcinogenic risk. Subchronic RfDs are sometimes used to evaluate exposures from 2 weeks to 7 years duration. However, chronic RfDs, which are sometimes lower than subchronic RfDs, are used in this risk assessment to ensure a conservative estimate of risk.

4.4 REFERENCES

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EPA (U.S. Environmental Protection Agency), 1986a. *Guidelines for Carcinogen Risk Assessment*, 51 Federal Register 33992, September 24, 1986.

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SECTION 5
RISK CHARACTERIZATION

The purpose of the risk characterization is to integrate the information from the exposure assessment and the toxicity assessment in order to estimate quantitatively the potential human health risks that are associated with exposure to the chemicals of potential concern at the EKCO facility. Human health risks are discussed separately for carcinogenic and noncarcinogenic health effects because of the different toxicologic endpoints involved and the different methods that are employed in characterizing the risks. The uncertainties associated with these risk estimates are discussed in Section 6.

Human health risks associated with exposure to carcinogenic chemicals are calculated by multiplying lifetime chemical exposure doses (i.e., daily intakes) by the corresponding chemical-specific cancer slope factors (i.e., risk = daily intake x slope factor). The cancer risk for a particular exposure pathway/route is then estimated by summing the risk estimates for all the chemicals of potential concern through that exposure pathway/route. This approach is in accordance with EPA guidelines on chemical mixtures in which risks associated with carcinogens are considered additive (EPA, 1986). It assumes independence of action by the chemicals (i.e., that there are no synergistic or antagonistic interactions), and that all of the chemicals have the same toxicological endpoint (i.e., cancer). The total cancer risk to an individual member of a receptor population is estimated by summing the combined cancer risks from all relevant exposure routes. The resulting cancer risks are expressed using one significant figure only.

In assessing the carcinogenic risks posed by a site, the NCP establishes a lifetime excess cancer risk of 1E-06 (one-in-one million) as a point of departure for establishing remediation goals. Excess cancer risks lower than 1E-06 are not addressed by the NCP. Excess cancer risks in the range from 1E-06 to 1E-04 (one-in-ten thousand) may or may not be considered acceptable, depending on site-specific factors such as the potential for exposure, technical limitations to remediation alternatives, and data uncertainties. In an

April 1991 OSWER Directive (EPA, 1991) from EPA's Assistant Administrator to Regional Directors, the EPA further clarified the acceptable carcinogenic risk range by stating that when reasonable maximum exposures for both current and future land uses are less than 1E-04 (one-in-ten thousand), action is generally not warranted, unless there are adverse environmental impacts. However, it should be noted that the same directive indicates that the risk manager may decide that a risk less than 1E-04 is unacceptable due to site-specific issues.

Noncarcinogenic health risks are expressed as hazard quotients and hazard indices. The hazard quotient (HQ) for a given chemical in a child or adult is equal to the estimated daily exposure dose (i.e., the daily intake) divided by the acceptable (safe) exposure dose (i.e., the RfD). This approach assumes that exposure to multiple chemicals through a particular exposure route could result in an additive adverse effect, the magnitude of which is proportional to the sum of the HQs. This sum is termed the hazard index (HI). A total HI can also be calculated for an individual receptor that is the sum of the HIs for all relevant exposure routes. When the calculated HQ for an individual chemical or the HI for multiple chemicals exceeds a value of one, there may be a potential for occurence of noncancer health effects. Since the assumption of additivity is most applicable to chemicals that induce the same type of adverse health effect, if the calculated HI is greater than one, then separate HIs can be determined for chemicals according to type of critical effect.

The methodology used to evaluate noncarcinogenic health effects, unlike that used to evaluate carcinogenic effects, does not produce quantitative estimates of risk. If an HQ or HI exceeds one, it simply indicates that there might be a potential for noncarcinogenic health effects to occur under the defined exposure conditions. Conversely, an HQ or HI of less than one indicates that it is unlikely for even sensitive populations to experience adverse noncarcinogenic health effects.

5.1 QUANTITATIVE RISKS ASSOCIATED WITH EXPOSURE TO GROUNDWATER FROM THE UPPER UNIT

Hypothetical future on-site residents using water wells screened in the upper (shallow/intermediate) groundwater unit were assumed to be exposed to site chemicals through drinking water ingestion, noningestion groundwater uses (showering, cooking), and ingestion of garden produce irrigated with groundwater.

5.1.1 Carcinogenic Health Risks

The potential carcinogenic risks associated with hypothetical future residential exposure to groundwater from the upper unit are summarized in Table 5-1. The estimated daily chemical intakes and chemical-specific carcinogenic risks for ingestion uses, noningestion household uses, dermal absorption while bathing, and garden produce ingestion are presented in Appendix B (Tables B-1, B-2, B-3, and B-4, respectively). Total (individual) carcinogenic risk for all exposure pathways was 4E-02 (four-in-one hundred). Inhalation through household noningestion uses contributed about 75% (3E-04) of total risk. The next highest risk was through drinking water ingestion, accounting for 15% (6E-03) of total risk. For the child, most of the risk was through inhalation. The pattern of distribution for the adult was similar to total individual risk. Garden produce ingestion showed a risk of 7E-04, which represented less than 2% of the total risk. Dermal absorption while showering accounted for less than 1% of total risk. Distribution of garden produce ingestion and dermal risk among children and adults showed the source pattern as described for total individual risk.

A summary of those chemicals which exceeded a total individual cancer risk of 1E-06 for the upper unit by exposure pathway is shown in Table 5-2. The two primary compounds contributing to total risk were 1,1-dichloroethene (DCE) (2E-02) and trichloroethane (TCE) (1E-02) through the inhalation pathway. TCE and DCE contributed 4E-03 and 2E-03, respectively, through ingestion of drinking water. Vinyl chloride contributed a total risk of 1E-03 most of which was approximately evenly divided between water ingestion and inhalation. Risks from ingestion of garden produce represented a small percentage of the

Table 5-1

Summary of Potential Carcinogenic Health Risks For the Upper and Lower Units by Exposure Pathway and Age Group Future On-Site Resident

EKCO Housewares, Massillon, Ohio

Exposure Pathway	Upper Unit			Lower Unit		
	Individual Cancer Risk	Adult Cancer Risk	Individual Cancer Risk	Child Cancer Risk	Adult Cancer Risk	Individual Cancer Risk
Ingestion of Groundwater	2E-03	4E-03	6E-03	2E-04	4E-04	6E-04
Dermal Absorption while Bathing	1E-04	2E-04	3E-04	7E-06	7E-06	2E-05
Noningestion Groundwater Uses	2E-02	1E-02	3E-02	2E-03	2E-03	3E-03
Ingestion of Garden Produce Irrigated with Groundwater	3E-04	4E-04	7e-04	1E-05	1E-05	3E-05
TOTAL	2E-02	2E-02	4E-02	2E-03	2E-03	4E-03

Table 5-2

Summary of Individual Chemical Cancer Risks Exceeding 1E-06 by Exposure Pathway for the Future On-Site Resident Upper Unit

Upper Unit Exposure Pathway	Chemical	Lifetime Carcinogenic Risk	Percent of Total Lifetime Risk[e]
Drinking Water Ingestion[a]	Trichloroethene	4E-03	9
	1,1-Dichloroethene	2E-03	5
	Vinyl chloride	8E-04	2
	1,2-Dichloroethane	1E-05	0.03
	1,1,2-Trichlorethane	1E-05	0.03
	Tetrachloroethene	6E-06	0.02
Dermal Absorption While Bathing[b]	1,1-Dichloroethane	1E-04	0.3
	Trichloroethane	2E-04	0.5
	Vinyl chloride	2E-05	0.04
Noningestion (Inhalation) Uses[c]	1,1-Dichloroethene	2E-02	53
	Trichloroethene	1E-02	26
	Vinyl chloride	6E-04	2
	1,2-Dichloroethane	6E-05	0.2
	1,1,2-Trichlorethane	7E-05	0.2
	Benzene	3E-06	<0.01
	Chloroform	1E-05	0.03
Garden Produce Ingestion[d]	Trichloroethene	6E-04	1
	1,1-Dichloroethene	1E-04	0.3
	Vinyl chloride	2E-05	0.05

[a]Refer to Table B-1 for detailed presentation; Total cancer risk for drinking water ingestion = 6E-03
[b]Refer to Table B-2 for detailed presentation; Total cancer risk for dermal absorption = 3E-04
[c]Refer to Table B-3 for detailed presentation; Total cancer risk for noningestion inhalation = 3E-02
[d]Refer to Table B-4 for detailed presentation; Total cancer risk for garden produce ingestion = 7E-04
[e]Total lifetime cancer risk for all pathways = 4E-02. Percentages are calculated from risks to two significant figures (Refer to Tables B-1 through B-4).

total, but were associated with risks of 1E-04 for 1,1-DCE and 6E-04 for TCE. Dermal risks were between 1E-05 and 1E-04 for DCE, TCE and vinyl chloride.

The individual cancer risk associated with exposure to 1,1-DCE exceeded 1E-02 for the noningestion (inhalation) exposure pathway and 1E-03 for drinking water ingestion. TCE risk exceeded 1E-02 for inhalation. Garden produce ingestion and dermal absorption while showering accounted for the smallest portion of risk for all chemicals.

The cancer risks associated with groundwater exposure for the upper unit exceeded the range of excess cancer risk (i.e., 1E-06 to 1E-04) set by the NCP for establishing remediation goals.

5.1.2 Noncarcinogenic Health Risks

The potential noncarcinogenic health risks associated with future (child and adult) residential exposure to groundwater in the upper unit are summarized in Table 5-3. The estimated daily chemical intakes and chemical-specific noncarcinogenic risks are presented in Appendix B for drinking water ingestion (Table B-1), dermal absorption while bathing (Table B-2), noningestion (inhalation) uses (Table B-3), and garden produce ingestion (Table B-4).

Table 5-3 shows that total HI for the child was 420, and for the adult was 150. The majority of these potential health effects were through ingestion of drinking water. For the child, HIs were: 240 (drinking water ingestion), 130 (inhalation), 44 (garden produce ingestion), and 11 (dermal absorption during bathing). For the adult, HIs were 100 (drinking water ingestion), 28 (inhalation), 14 (garden produce ingestion), and 5.9 (dermal absorption during bathing).

Table 5-4 presents noncancer risks (HQs) by chemical and exposure pathway for the adult and child. TCE was the primary contributor in all exposure pathways for both the adult and child. The hazard quotients for the child were about 2 to 3 times higher in general than for

Table 5-3

Summary of Potential Noncarcinogenic Health Risks for the Upper and Lower Units by Exposure Pathway and Age Group
Future On-Site Resident
EKCO Housewares
Massillon, Ohio

Exposure Pathway	Upper Unit		Lower Unit	
	Child Hazard Index	Adult Hazard Index	Child Hazard Index	Adult Hazard Index
Ingestion of Groundwater	2.4E+02	1.0E+02	3.8E+00	1.6E+00
Dermal Absorption while Bathing	1.1E+01	5.9E+00	1.5E-01	8.3E-02
Noningestion Groundwater Uses (Inhalation)	1.3E+02	2.8E+01	1.1E+01	2.4E+00
Ingestion of Garden Produce Irrigated with Groundwater	4.4E+01	1.4E+01	5.5E-01	1.7E-01
TOTAL	4.2E+02	1.5E+02	1.6E+01	4.2E+00

the adult. The highest HQ was 240 for TCE for the child via drinking water ingestion. The adult showed a HQ of 100 for TCE. The HQ for the child for dermal absorption of TCE during bathing was 10. TCE was associated with HQs of 44 and 110 for ingestion and inhalation, respectively. Dermal absorption during bathing resulted in the lowest hazard quotients for all chemicals.

Other VOCs that had HQs exceeding one were:

- 1,1-DCE via inhalation
  - 12 (child)
  - 2.5 (adult)
- 1.1-DCE via drinking water ingestion
  - 1.6 (child)
- 1,2-dichloroethane via inhalation
  - 5 (child)
  - 1.1 (adult)
- 1,1,1-trichloroethane via inhalation
  - 2.6 (child)
- 1,1-dichloroethane via inhalation
  - 2.2 (child)
- 1,1,2-trichloroethane via inhalation
  - 1.9 (child)

The noncancer health risks associated with exposure to the upper unit groundwater exceeded unity (1.0) for each exposure pathway examined.

5.2 QUANTITATIVE RISKS ASSOCIATED WITH EXPOSURE TO GROUNDWATER FROM THE LOWER UNIT

Hypothetical future on-site residents using water wells screened in the lower groundwater unit (bedrock aquifer) were assumed to be exposed to site chemicals through drinking water ingestion, inhalation from household noningestion uses, dermal absorption during bathing, and garden produce ingestion via irrigation.

5.2.1 Carcinogenic Health Risks

The potential carcinogenic risks associated with future on-site residential exposure to groundwater from the lower unit are summarized in Table 5-1. The estimated daily chemical intakes and chemical-specific carcinogenic risks are presented in Appendix B for ingestion (Table B-5), dermal absorption while bathing (Table B-6) noningestion (inhalation) household uses (Table B-7), and garden produce ingestion (Table B-8).

Table 5-1 shows that total individual lifetime cancer risk was 4E-03 for the lower unit, which was evenly divided (2E-03) for the child and adult. Inhalation was the greatest total risk of all pathways at 3E-03 (about 75% of total risk for all pathways). Again, this risk was evenly divided between child and adult. Total cancer risk for drinking water ingestion was about 12% of all pathways (6E-04). Dermal absorption while bathing and garden produce ingestion were between 1E-06 and 1E-05, again generally split evenly between child and adult.

Table 5-5 presents a summary for all chemicals by pathway for which total individual cancer risks exceeded 1E-06. The primary contributor to total cancer risk was 1,1-DCE with a risk of 3E-03 (~81% of total). Noningestion use (inhalation) risk for 1,1-DCE was 10 times higher than that for drinking water ingestion. The second highest contributor to total individual risk was vinyl chloride (4E-04; ~12% of total). Risk from drinking water ingestion was approximately equal to risk for noningestion (inhalation) uses.

1,1-DCE was associated with risks of 1E-05, each, for dermal exposure and garden produce ingestion from lower unit groundwater. Vinyl chloride and TCE each produced risks for these pathways between 2E-06 and 6E-06. Total lifetime carcinogenic risks for these three chemicals were approximately two orders of magnitude lower than the risk for these three chemicals by ingestion and inhalation while showering combined (1E-05 vs. 1E-03, respectively). Therefore, both dermal and garden produce ingestion risks were each about 0.1% of total risk for these chemicals.

Table 5-4

Summary of Individual Chemical Noncancer Risks Exceeding A Hazard Quotient of One By Exposure Pathway and Age Group for the Future On-Site Resident

Upper Unit

Upper Unit Exposure Pathway	Chemical	Hazard Quotient[e]	
		Adult	Child
Drinking Water Ingestion[a]	Trichloroethene	110 (68)[f]	240 (56)
	1,1-Dichloroethene	--	1.6 (<1)
Dermal Absorption While Bathing[b]	Trichloroethane	5.9(4)	10(2)
Noningestion (Inhalation)[c]	Trichloroethene	23 (16)	110 (26)
	1,1-Dichloroethene	2.5(2)	12 (3)
	1,1-Dichloroethane	--	2.2 (<1)
	1,2-Dichloroethane	1.1(<1)	5.0 (1)
	1,1,1-Trichloroethane	--	2.6 (<1)
	1,1,2-Trichloroethane	--	1.9 (<1)
Garden Produce Ingestion[d]	Trichloroethene	13 (9)	44 (10)

[a]Refer to Table B-1 for detailed presentation; Total HI = 100 (adult), Total HI = 240 (child) for drinking water ingestion.
[b]Refer to Table B-2 for detailed presentation; Total HI = 5.9 (adult), Total HI = 11 (child) for dermal absorption
[c]Refer to Table B-3 for detailed presentation; Total HI = 28 (adult), Total HI = 130 (child) for noningestion uses.
[d]Refer to Table B-4 for detailed presentation; Total HI = 14 (adult), Total HI = 44 (child) for garden produce ingestion.
[e]Total hazard index for all pathways: Adult = 150; Child = 420.
[f]Number in parentheses (next to hazard quotient) is percent of total hazard index for all pathways for the adult or child.

Table 5-5

Summary of Individual Chemical Cancer Risks Exceeding 1E-06 By Exposure Pathway for the Future On-Site Resident

Lower Unit

Lower Unit Exposure Pathway	Chemical	Lifetime Carcinogenic Risk	Percent of Total Lifetime Risk[e]
Drinking Water Ingestion[a]	1,1-Dichloroethene	3E-04	7
	Vinyl chloride	2E-04	6
	Trichloroethene	4E-05	1
Dermal Absorption While Bathing[b]	1,1-Dichloroethene	1E-05	0.4
	Vinyl chloride	5E-06	0.1
	Trichloroethene	2E-06	0.05
Noningestion (Inhalation)[c]	1,1-Dichloroethene	3E-03	74
	Vinyl chloride	2E-04	5
	Trichloroethene	1E-04	3
Garden Produce Ingestion[d]	1,1-Dichloroethene	1E-05	0.4
	Vinyl Chloride	6E-06	0.2
	Trichloroethene	6E-06	0.2

[a]Refer to Table B-5 for detailed presentation; Total lifetime cancer risk for drinking water ingestion = 6E-04.
[b]Refer to Table B-6 for detailed presentation; Total lifetime cancer risk for dermal absorption = 2E-05.
[c]Refer to Table B-7 for detailed presentation; Total lifetime cancer risk for noningestion (inhalation) uses = 3E-03.
[d]Refer to Table B-8 for detailed presentation; Total lifetime cancer risk for garden produce ingestion = 3E-05.
[e]Total lifetime cancer risk for all pathways = 4E-03. Percentages are calculated from risks to two significant figures (Refer to Tables B-5 through B-8).

The total cancer risks and certain chemical cancer risks (e.g., 1,1-DCE, TCE and vinyl chloride) associated with the groundwater pathway for the lower unit exceeded the range of excess cancer risk (i.e., 1E-06 to 1E-04) set by the NCP for establishing remediation goals.

5.2.2 Noncarcinogenic Health Risks

The potential noncarcinogenic health risks associated with exposure of a hypothetical future on-site resident to groundwater in the lower unit are summarized in Table 5-3. The estimated daily chemical intakes and chemical-specific noncarcinogenic risks are presented in Appendix B for drinking water ingestion (Table B-5) and noningestion uses (Table B-7). The total hazard indices for the ingestion and noningestion exposure pathways ranged from 4 to 16 for the adult and the child, respectively. The highest HIs were observed for the inhalation pathway (adult, 2.4; child, 11). The second highest contributor to risk by pathway was drinking water ingestion (1.6, adult; 3.8, child). Noncancer HIs from dermal contact and garden produce ingestion represented 30% or less of total HI for the child and adult. Neither of these pathways exceeded an HI of 1 for the adult or child.

The distribution of noncancer effects in the lower unit by chemical is shown in Table 5-6. Three chemicals of all evaluated showed HQs of greater than 1. These were:

- TCE via inhalation
  - 1.1 (child)
- TCE via drinking water ingestion
  - 2.5 (child)
  - 1.1 (adult)
- 1,1-DCE via inhalation
  - 1.7 (child)
- 1,2-DCE via inhalation
  - 7.6 (child)
  - 1.6 (adult)

Table 5-6

Summary of Individual Chemical Noncancer Risks Exceeding A Hazard Quotient of One By Exposure Pathway and Age Group for the Future On-Site Resident

Lower Unit

Upper Unit Exposure Pathway	Chemical	Hazard Quotient[c]	
		Adult	Child
Drinking Water Ingestion[a]	Trichloroethene	1.1 (26)[d]	2.5 (16)
Noningestion (Inhalation)[b]	Trichloroethene	--	1.1 (7)
	1,1-Dichloroethene	--	1.7 (11)
	1,2-Dichloroethene	1.6 (38)	7.6 (48)

[a]Refer to Table B-5 for detailed presentation; Total HI = 1.6 (adult), Total HI = 3.8 (child) for drinking water ingestion.
[b]Refer to Table B-7 for detailed presentation; Total HI = 2.4 (adult), Total HI = 11 (child) for noningestion uses.
[c]Total hazard index for all pathways: Adult = 4.2; Child = 16.
[d]Number in parentheses (next to hazard quotient) is percent of total hazard index for all pathways for the adult or child.

The noncancer health risks for the child and for the adult associated with the lower groundwater unit exceeded unity (1.0) for the drinking water ingestion exposure pathway and for the noningestion (inhalation) exposure pathway.

5.3 CONCLUSIONS

Total cancer risks in the upper unit were 4E-02. The major contributors (i.e., greater than 1E-04) to risk were from TCE, 1,1-DCE and vinyl chloride through drinking water ingestion and inhalation while showering and for TCE for garden produce ingestion. Total dermal cancer risks were 3E-04 with TCE exceeding a risk of 1E-04. Total HI by all pathways for the child was 420, and for the adult was 150. Total HI exceeded 1 for each exposure pathway for the child and adult, with drinking water ingestion producing the majority of risk. Garden produce ingestion was about 10% of total HI (adult and child) and dermal HI from 1 to 3%. TCE and 1,1-DCE were the principal contributors to hazard index primarily through drinking water ingestion and inhalation. TCE contributed approximately 5 to 10% of total HI for garden produce ingestion (adult and child, respectively) and less than 5% for dermal absorption while bathing.

For the lower unit, the total cancer risk (4E-03) was an order of magnitude lower than that from the upper unit. About 75% of total lifetime cancer risk was associated with inhalation from household uses (bathing, cooking), and was split evenly between childhood (ages 1 to 6 years) and adult (ages 7 to 30 years) exposure. The majority of this risk was due to the inhalation of 1,1-DCE, TCE and vinyl chloride. About 15% of total risk was due to drinking water ingestion, and about 1% each were due to garden produce ingestion and dermal absorption while bathing. The drinking water ingestion risk was influenced primarily by 1,1-DCE and vinyl chloride.

For noncancer risks in the lower unit, the majority of risk was associated with inhalation from household noningestion uses for both the child (approximately 70%) and adult (approximately 60%). 1,2-DCE contributed to the greatest extent through this exposure pathway for both the child and adult. Drinking water ingestion (primarily TCE) also

contributed substantially to child and adult risk, with HQs greater than 1.

Future exposure to the lower groundwater unit posed less total cancer and noncancer risks than to the upper unit. Total risks for both units were greater than the points of departure of 1E-04 (cancer risk) and a hazard index of one (noncancer risk). A discussion of uncertainties and assumptions is presented in the next Section (6) of the report.

5.4 REFERENCES

EPA (United States Environmental Protection Agency), 1986. *Guidelines for Carcinogenic Risk Assessment*. **Federal Register. 51 (185):33992.**

EPA (United States Environmental Protection Agency), 1991. *Role of the Baseline Risk Assessment in Superfund Remedy Selection Decisions*. Memorandum from Don R. Clay, Assistant Administrator. OSWER Directive 9355.0-30.

SECTION 6
UNCERTAINTY ANALYSIS

6.1 INTRODUCTION

The principal goals of the uncertainty analysis are to provide to the appropriate decision makers a discussion of the key assumptions made in the risk assessment that significantly influence the risk results and to assess the contribution of these factors to the under- or overestimation of risk. The uncertainty analysis should show that the calculated risks are relative in nature and do not represent an absolute quantification.

In recent months, the U.S. EPA has placed even more emphasis on the uncertainty analysis. In a 26 February 1992 memorandum from the Deputy Administrator to all assistant and regional administrators (EPA, 1992), U.S. EPA provides additional guidance on explaining risks and all their underlying data so that the strengths and weaknesses of the assessment become clear. This section of the risk assessment attempts to explain the key assumptions used in this report and to present the range of variability inherent in these assumptions.

In the absence of empirical or site specific data, assumptions are developed based on best estimates of data quality, exposure parameters and dose-response relationships. To assist in the development of these estimates, the EPA recommends the use of guidelines and standard exposure factors in risk assessments conducted under CERCLA (EPA, 1989; 1991). The use of these standard factors is intended to promote consistency among risk assessments where assumptions must be made for high-end (RME) risk estimates. Although the use of standard factors no doubt promotes comparability, their usefulness in accurately predicting risk is directly proportional to their applicability to the site-specific conditions.

The carcinogenic and noncarcinogenic risk estimates for the EKCO Facility were based on a number of assumptions that incorporated varying degrees of uncertainty resulting from several sources, including those pertaining to:

- Selection of exposure pathways, input parameters, algorithms and scenarios.
- Confidence in toxicological data used to estimate cancer potency factors and noncancer reference doses.

6.2 SUMMARY OF SIGNIFICANT CANCER AND NONCANCER RISKS AT THE EKCO HOUSEWARES FACILITY

Tables 6-1, 6-2 and 6-3 summarize the chemicals and exposure pathways that contributed greater than 1E-04 to carcinogenic risk and greater than a hazard quotient of 10 to noncarcinogenic risk in the upper and lower groundwater units for the hypothetical future on-site resident.

6.2.1 Upper Unit Groundwater Risks

Table 6-1 shows that of all chemicals evaluated, the primary contributor to total cancer risk in the upper unit (4E-02) was 1,1-DCE with a chemical risk of 2E-02 (~60% of total) through inhalation from household noningestion uses. TCE contributed about 35% (approximately 1E-03) of total risk, the major portion of this risk being through inhalation noningestion household uses. Vinyl chloride presented about 3% (1E-04) of total risk chiefly through drinking water ingestion and inhalation from household noningestion uses.

Table 6-2 shows that TCE was the primary chemical producing potential noncancer health effects, contributing about 92% of the total child HI, and about 93% of the adult HI. This amounted to an HQ of about 400 and 140 for the child and adult, respectively. About 23% of total child HI (HQ=12) was accounted for by 1,1-DCE.

6.2.2 Lower Unit Groundwater Risks

Table 6-3 shows that two chemicals in the lower unit groundwater exceeded cancer risks of 1E-04: 1,1-DCE and vinyl chloride. The highest contributor was 1,1-DCE via inhalation through household noningestion uses (about 74%). No chemicals exceeded a noncarcinogenic hazard quotient of 10 for any exposure pathway evaluated in the lower unit.

Table 6-1

Summary of Individual Chemical Cancer Risks Exceeding 1E-04 by Exposure Pathway for the Future On-Site Resident

Upper Unit

Upper Unit Exposure Pathway	Chemical	Lifetime Carcinogenic Risk	Percent of Total Risk[e]
Drinking Water Ingestion[a]	Trichloroethene 1,1-Dichloroethene Vinyl chloride	4E-03 2E-03 8E-04	9 5 2
Dermal Absorption While Bathing[b]	Trichloroethene	2E-04	0.5
Noningestion (Inhalation)[c]	1,1-Dichloroethene Trichloroethene Vinyl chloride	2E-02 1E-02 6E-04	53 26 2
Garden Produce Ingestion[d]	Trichloroethene	6E-04	1

[a]Refer to Table B-1 for detailed presentation; Total cancer risk for drinking water ingestion = 6E-03
[b]Refer to Table B-2 for detailed presentation; Total cancer risk for dermal absorption = 3E-04
[c]Refer to Table B-3 for detailed presentation; Total cancer risk for noningestion (inhalation) = 3E-02
[d]Refer to Table B-4 for detailed presentation; Total cancer risk for garden produce ingestion = 7E-04
[e]Total lifetime cancer risk for all pathways = 4E-02

Table 6-2

Summary of Individual Chemical Noncancer Risks Exceeding A Hazard Quotient of Ten By Exposure Pathway and Age Group for the Future On-Site Resident

Upper Unit

Upper Unit Exposure Pathway	Chemical	Hazard Quotient[d]	
		Adult	Child
Drinking Water Ingestion[a]	Trichloroethene	100 (68)[e]	240 (56)
Noningestion (Inhalation)[b]	Trichloroethene 1,1-Dichloroethene	23 (16) --	110 (26) 12 (3)
Garden Produce Ingestion[c]	Trichloroethene	13 (9)	44 (10)

[a]Refer to Table B-1 for detailed presentation; Total HI = 100 (adult), Total HI = 240 (child) for drinking water ingestion.
[b]Refer to Table B-3 for detailed presentation; Total HI = 28 (adult), Total HI = 130 (child) for noningestion (inhalation).
[c]Refer to Table B-4 for detailed presentation; Total HI = 14 (adult), Total HI = 44 (child) for garden produce ingestion.
[d]Total hazard index for all pathways: Adult = 150; Child = 420.
[e]Number in parentheses (next to hazard quotient) is percent of total hazard index for all pathways for the adult or child.

Table 6-3

Summary of Individual Chemical Cancer Risks Exceeding 1E-04 By Exposure Pathway for the Future On-Site Resident

Lower Unit

Lower Unit Exposure Pathway	Chemical	Lifetime Carcinogenic Risk	Percent of Total Lifetime Risk[c]
Drinking Water Ingestion[a]	1,1-Dichloroethene	3E-04	7
	Vinyl chloride	2E-04	6
Noningestion (Inhalation)[b]	1,1-Dichloroethene	3E-03	74
	Vinyl chloride	2E-04	5

[a]Refer to Table B-5 for detailed presentation; Total lifetime cancer risk for drinking water ingestion = 6E-04.
[b]Refer to Table B-7 for detailed presentation; Total lifetime cancer risk for noningestion (inhalation) = 3E-03.
[c]Total lifetime cancer risk for all pathways = 4E-03.

6.2.3 Conclusions

These chemicals and exposure pathways, which were the highest contributors to the site risks, and their associated uncertainties are the main focus of the following discussion. General uncertainties inherent in the risk assessment process (i.e., standard default assumptions) are presented where they are relevant to the EKCO Facility.

6.2.4 Uncertainties Associated with Exposure Assessment

The exposure assumptions directly influence the calculated doses (daily intakes), and ultimately the calculation of risk. In general, conservative exposure assumptions were made in calculating exposure doses such as the selection of exposure routes and scenarios, and the exposure input factors (e.g., contact rate, exposure frequency, exposure duration, body weight and surface area) used to estimate exposure doses. In most cases, these uncertainties contribute to overestimation of plausible real-life exposures, and therefore, true risk is overestimated. These assumptions are appropriate when performing risk assessments of this type so that risk managers can be reasonably assured that human health risks are not underestimated, and so that risk assessments for different sites can be compared.

The concept of reasonable maximum exposure (RME) was used to develop exposure doses for the hypothetical future on-site resident, and is defined as the "maximum exposure that is reasonably expected to occur at the site (EPA, 1989)." Several significant variables that determine the exposure doses for the RME are based on upper-bound (typically 90th to 95th percentile or greater) estimates. These are:

- The 95% upper confidence limit of the average medium concentration for the chemical used to calculate the exposure dose.
- Intake/contact rate (IR) (upper-bound value).
- Exposure frequency (EF) (upper-bound value).
- Exposure duration (ED) (upper-bound value).

Therefore, the calculated exposure dose for any given chemical, which results from integration of all of these variables, represents an upper-bound (high-end) estimate of the probable exposure dose. The use of these upperbound exposure parameters, coupled with conservative estimates of toxicity, in turn will yield risk results that represent an upper-bound estimate of the carcinogenic and noncarcinogenic health risks. Below are discussed several site specific uncertainties which relate to calculation of exposure concentration.

6.2.4.1 Improbable Use of Upper Unit as a Drinking Water Source

Exposure to the upper groundwater unit is highly improbable in the future in view of the fact that this unit is not currently used because of its low yield (See Appendix C). The majority of both cancer and noncancer risks calculated for this unit was through ingestion and household noningestion (inhalation while showering) uses. Relatively small percentages of total risk were associated with garden produce ingestion and dermal contact during bathing for this unit.

In view of the very low probability that the upper unit would ever be used as a drinking water source in the future, the risks calculated for the upper unit based on drinking water ingestion and household noningestion uses should be viewed as hypothetical. Assuming the upper unit was used in the future as a source for watering of home grown vegetables, total lifetime cancer risk for the upper unit would be about 7E-04 and the noncancer HI would be about 44 (child) and 14 (adult).

6.2.4.2 Dilution and Degradation of Volatiles in Upper and Lower Units

Exposure concentrations of VOCs calculated for both the upper and lower groundwater units are likely overestimated to a high degree relative to a 30-year residence time by future on-site residents. It was conservatively assumed in the risk calculations that there would be no degradation or dilution of the VOCs in groundwater.

Also, it is noted that during watering of gardens, VOCs in the groundwater will volatize, and therefore the concentration of VOCs that was used to estimate vegetable and fruit uptake is overestimated. VOC concentrations are expected to decrease significantly during the 30 year lifetime of the future resident. TCE, for example, evaporates from water very quickly (minutes to hours), and although degradation processes are slow, the approximate half-life of TCE in water influenced by biodegradation is about 10 to 11 months (Howard, 1990). Moreover, based on pump and treatment systems currently in operation, removal of VOCs over a period of years will result in relatively lower exposure concentrations averaged over the next 30 years. This expected reduction in the estimated exposure point concentration will be proportionately reflected in lower cancer and noncancer risks associated with both the upper and lower groundwater units.

6.2.4.3 Central Tendency Exposure Issues

The "Habicht Memorandum" (EPA, 1992) on risk characterization recommends a discussion of the range of exposures and multiple risk descriptors in the uncertainty analysis (e.g., central tendency) in addition to the RME calculations, which are consistent with the mandate to evaluate the "high end" risk descriptor (EPA, 1992). Central tendency risk descriptors are described by EPA (1992) as "either the arithmetic mean risk or the median risk." RME is defined as "the highest exposure that is reasonable expected to occur at a site" (EPA, 1989). In practice, the RME is estimated by combining upper bound (90-95th percentile) values for some but not all exposure parameters. WESTON obtained relevant central tendency exposure values from EPA Region V (Personal Communication, 1994). These were used to estimate average risks for those chemicals having significant impact on the (RME) risk presented for the upper and lower groundwater units (Section 5).

Table 6-4 compares the exposure input values used to obtain RME and average risk. The central tendency values were incorporated into the exposure algorithms in Section 3 where appropriate (Table 3-1, drinking water ingestion; Table 3-2, inhalation while bathing), and Table 3-3, ingestion of garden produce). Dermal absorption was not evaluated since this pathway was a minor contributor to total risk. A ratio of the central (CT) tendency

Table 6-4

Comparison of Exposure Input Values[a] for RME and Average (Central Tendency) Exposure Dose Calculations

Variable	Input Values			
	RME		Central Tendency	
	Child	Adult	Child	Adult
IR (m^3/day)	15	15	15	15
IR (L/day)	1	2	0.7	1.4
EF (days/year)	350	350	234	234
ED (years)	6	24	2	7
AT-Noncancer (days)	2,190	8,760	730	2,555
AT-Cancer (days)	25,550	25,550	25,550	25,550

RME = Reasonable maximum exposure
IR = Ingestion rate (drinking water)
EF = Exposure frequency
ED = Exposure duration
AT = Averaging time (cancer, or noncancer)

[a] Only those exposure input variables shown in the table were changed. Inhalation rates for showering are shown but did not change in the inhalation exposure equation. All other values (Tables 3-1, 3-2, 3-3, and 3-4) remained identical (i.e., the RME default variables).

exposure to the RME exposure was calculated for each exposure algorithm for the child and adult (excluding the "C_w" term). The detailed calculations are presented in Table B-9 in Appendix B. This ratio was then multiplied with the respective RME risks to obtain the average risk. The results are summarized in Table 6-5. The range of both child and adult cancer and noncancer risks decreased by 30 to 90% compared to the RME risk. The decrease was dependent on the groundwater unit, chemical and exposure pathway compared to the RME risk.

6.2.5 Uncertainties Associated with Toxicity Assessment

For a risk to exist, both significant exposure to the pollutants of concern and toxicity at these predicted exposure levels must exist. The toxicological uncertainties primarily relate to the methodology by which carcinogenic and noncarcinogenic criteria (i.e., cancer slope factors and reference doses) are developed. In general, the methodology currently used to develop cancer slope factors and reference doses is conservative, and likely results in overestimation of human toxicity (EPA, 1989). These and other factors are discussed in the subsections below.

6.2.5.1 Cancer Slope Factors

Although there is evidence to suggest some carcinogens may exhibit thresholds, cancer slope factors are developed assuming there is no safe level of exposure to any chemical proven or suspected to cause cancer. This uncertainty implies that exposure to even a single molecule of a chemical may be associated with a finite risk, however small. The assumption is that even if relatively large doses of a pollutant were required to cause cancer in laboratory animals (i.e., much higher than a person would ever likely be exposed to over a lifetime), these exposure doses can be linearly extrapolated downward many orders of magnitude to estimate slope factors for humans. A significant uncertainty for the carcinogens is whether the cancer slope factors accurately reflect the carcinogenic potency of these chemicals at low exposure concentrations. The calculated slope factor is used to estimate an upperbound lifetime probability of an individual developing cancer as a result

Table 6-5

Comparison of Average and RME Risk Estimates[a] for Selected Chemicals in the Upper and Lower Groundwater Units

Groundwater Unit	Health Effect Evaluated	Chemical	Exposure Pathway	RME Risk		Average Risk	
				Child	Adult	Child	Adult
Upper	Cancer	TCE	Water Ingestion	1.3E-03	2.3E-03	2.0E-04(85)[b]	3.1E-04 (87)
		1,1-DCE	Inhalation	1.1E-02	9.3E-03	2.5E-03 (77)	1.8E-03 (81)
	Noncancer	TCE	Water Ingestion	240	100	110 (54)	47 (53)
		TCE	Inhalation	110	23	74 (33)	15 (35)
		TCE	Vegetable Ingestion	44	13	29 (34)	8.7 (33)
Lower	Cancer	1,1-DCE	Water Ingestion	1.0E-04	1.8E-04	1.6E-05 (84)	2.5E-05 (86)
		1,1-DCE	Inhalation	1.5E-03	1.3E-03	3.3E-04 (78)	2.5E-04 (81)

[a] Refer to Table B-9 in Appendix B for detailed calculations.

[b] Numbers in parentheses refer to percentage decrease in converting from RME to average risk.

of exposure to a particular level of a carcinogen. Therefore, the cancer slope factors developed by EPA are generally conservative and represent the upperbound limit of the carcinogenic potency of each chemical. The actual risk posed by each chemical is unknown, but is likely to be lower than the calculated risk, and may even be as low as zero (EPA 1989). The conclusion is that these toxicity assumptions will typically result in an overestimation of carcinogenic risk.

The assumption that all carcinogens (whether A, B1, B2, or C) can cause cancer in humans is also conservative. Only those chemicals classified as "A" carcinogens by the EPA are unequivocally considered human carcinogens. The other three classes are probable (B1, B2) or possible (C) human carcinogens. In this risk assessment, all "probable" and "possible" carcinogens are given the same weight in the toxicity assessment (and consequently in the estimation of risk) as true human carcinogens. This assumption most likely overestimates actual carcinogenic risk to the human.

1,1-Dichloroethene (1,1-DCE)

Although 18 studies have been evaluated by EPA for potential cancer risk, only a single inhalation animal toxicity study is considered by EPA to be sufficient evidence that 1,1-DCE is a complete carcinogen (ATSDR, 1989). Thus, there is question as to whether 1,1-DCE is truly an inhalation carcinogen in humans. It is currently classified as a "C" carcinogen (see Table 4-2). Therefore, the potential risk from exposure by inhalation (noningestion household uses) and ingestion of groundwater may be moderately overestimated.

Trichloroethene

The oral and inhalation slope factors for trichloroethene (TCE) are currently under review by EPA (IRIS, 1994). Until questions regarding the adequacy of the critical studies and the toxicity criteria for TCE are resolved, there is some uncertainty in estimating its potential cancer risk. Since the slope factor is subject to change, it is not possible to calculate accurately the cancer risk associated with TCE.

Vinyl Chloride

Currently, vinyl chloride is under review by the EPA (IRIS, 1994). A value of 1.9E+0 $(mg/kg\text{-}day)^{-1}$, which is based on scientific data from 1984 and 1985, was used for the oral cancer slope factor (EPA, 1994). The slope factor is likely to change soon in view of recently available data, but which has not yet been completely evaluated by U.S. EPA. In their view (IRIS, 1994) the potency of vinyl chloride as an oral carcinogen is likely to increase. Consequently, the cancer risk due to the ingestion of vinyl chloride may be underestimated.

6.2.5.2 Reference Doses

In the development of reference doses (RfDs) for each chemical by exposure route, it is assumed that a threshold dose exists below which there is no potential for adverse health effects to the most sensitive individuals in the population. The RfD is typically derived from dose-response studies in animals in which a NOAEL (no-observed-adverse-effect level) or a LOAEL (lowest-observed-adverse-effect level) is determined by applying several uncertainty factors of 10 each. An additional modifying factor of up to 10 can be applied which accounts for a qualitative professional assessment of additional uncertainties in the available toxicity data (EPA, 1989). The final degree of extrapolation for a given chemical can range anywhere between 10 and 100,000 and therefore result in a human subthreshold dose of one tenth to one-hundred thousandth of the study dose. In general, the calculated RfD is overly protective, and its use probably results in a moderate to high overestimation of noncarcinogenic risk.

Use of Chronic RfDs in Children

Oral chronic RfDs were used in calculating hazard quotients for the 1 to 6 year old child. The use of chronic RfDs in this age group is conservative and will result in an overestimation of risk. Chronic RfDs are developed assuming a lifetime daily exposure. Subchronic RfDs, which are usually based on an exposure duration of 2 weeks to 7 years,

generally tend to be greater than chronic RfDs, and therefore, would in some cases result in a lower hazard quotient and index.

6.2.6 Summary and Conclusions of Uncertainy Analysis

Cancer risks based on future residential development in both upper and lower units exceeded the 1E-04 benchmark used by EPA (1992a) with the upper (1E-02) being about one order of magnitude higher than the lower unit (1E-03). The same pattern was evident for noncancer risks. For both cancer and noncancer risks, the largest contributors by chemical were TCE, 1,1-DCE and vinyl chloride, with groundwater ingestion and inhalation while showering posing the greatest risks.

Table 6-6 summarizes the primary uncertainties and assumptions used to evaluate risks at the EKCO Housewares Facility and their relative impact on risk. It is concluded from this uncertainty analysis that site risk has been moderately to highly overestimated based on an integration of all key assumptions used in the risk assessment for this facility.

Several important factors at the EKCO Housewares Facility support their conclusion:

- Based on the unlikely use of the upper unit for drinking water and household noningestion uses, the total risks for this unit are significantly overestimated. The total risks associated with this unit are most relatistically associated with use of this unit for watering of home grown vegetables and fruits.

- There is a low probability that the site will be developed residentially, and therefore risks for both units are likely overestimated.

- Due to dilution and degradation processes and pump and treatment systems already in place, the actual exposure concentration to all VOCs are expected to be significantly lower averaged over the next 30 years.

Table 6-6

Summary of Uncertainty Analysis
EKCO Housewares Facility

Uncertainty Element	Effects on Risk Estimate		
	Potential for Overestimation	Potential for Underestimation	Potential for Over- or Underestimation
Exposure Assessment			
• Standard assumptions regarding body weights, skin surface areas, inhalation rates, and life expectancy			Low
• Media intake rates	Moderate		
• Exposure frequencies	Moderate		
• Exposure durations	Moderate		
• Use of upper unit for residential drinking water and other household uses	High		
• Dilution and degradation of VOCs	High		
Toxicity Assessment			
• Use of chronic RfDs for estimating noncancer risk in children	Moderate		
• Cancer slope (potency) factors	High		
• 1,1-Dichloroethylene • Trichloroethylene • Vinyl chloride	Moderate	Moderate	High
• Reference doses	Moderate-High		

6.3 REFERENCES

ATSDR (Agency for Toxic Substances and Disease Registry), 1989. *Toxicological Profile for 1,1-Dichloroethethylene*, Final Report, Clement Associates, Contract No. 205-88-0608, PB90-182114.

EPA (U.S. Environmental Protection Agency), 1989. *Risk Assessment Guidance for Superfund, Volume 1, Human Health Evaluation Manual* (Part A). Interim Final. Office of Solid Waste and Emergency Response, Washington, D.C. EPA/540/1-89/002.

EPA (U.S. Environmental Protection Agency), 1991. *Human Health Evaluation Manual, Supplemental Guidance: "Standard Default Exposure Factors"*. Office of Solid Waste and Emergency Response, Washington, D.C. OSWER Directive 9285.6-03.

EPA (U.S. Environmental Protection Agency), 1992. *Guidance on Risk Characterization for Risk Managers and Risk Assessors*. Memorandum from F. Henry Habicht, II to Assistant and Regional Administrators. Feb. 26, 1992.

EPA (U.S. Environmental Protecton Agency), 1994. *Health Effects Assessment Summary Tables*. FY-94 Annual. OSWER Publication NO. 9200.6-303 (94-1). EPA540/R-94/020. March 1994.

Howard, P.H., 1990. *Handbook of Environmental Fate and Exposure Data for Organic Chemicals, Volume II, Solvents*. *"Trichloroethylene."* p. 467. Lewis Publishers, Chelsea, MI

IRIS (Integrated Risk Information System), 1994. Computerized data base of toxicity information or hazardous chemicals maintained by U.S. EPA, Washington, D.C.

Personal Communication. 1994. *Phone conversation between Sally Averill, Project Manager, EPA Region V, RCRA Branch, and Robert Warwick, Ph.D., Technical Manager, Risk Assessment, Roy F. Weston, Co.* 8 November 1994.

APPENDIX A

RAW DATA

Roy F. Weston, Inc. - Gulf Coast Laboratories
VOLATILES BY GC/MS, HSL LIST
Report Date: 05/20/94 11:11

RFW Batch Number: 9405G855 Client: Ekco Houseware Work Order: 02994-002-005-9 Page: 1a

	Cust ID:	L-1	L-1	L-1 Dup	L-1 Dup	L-2	L-2
Sample Information	RFW#:	001	001 DL	002	002 DL	003	003 DL
	Matrix:	WATER	WATER	WATER	WATER	WATER	WATER
	D.F.:	1.0	5.0	1.0	5.0	1.0	20.0
	Units:	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
Surrogate Recovery	Toluene-d8	98 %	102 %	96 %	106 %	95 %	111 * %
	Bromofluorobenzene	96 %	110 %	96 %	107 %	99 %	110 %
	1,2-Dichloroethane-d4	96 %	111 %	97 %	111 %	96 %	114 %
Chloromethane		2 U	NA	2 U	NA	2 U	NA
Bromomethane		2 U	NA	2 U	NA	2 U	NA
Vinyl chloride		20	NA	19	NA	1 U	NA
Chloroethane		2 U	NA	2 U	NA	2 U	NA
Methylene Chloride		1 U	NA	1 U	NA	1 U	NA
Acetone		7 B	NA	6 B	NA	4 B	NA
Carbon disulfide		1 U	NA	1 U	NA	1 U	NA
1,1-Dichloroethene		2	NA	2	NA	1 U	NA
1,1-Dichloroethane		E	26	E	31	1 U	NA
1,2-Dichloroethene (total)		E	42	E	42	2	NA
Chloroform		1 U	NA	1 U	NA	1 U	NA
1,2-Dichloroethane		1 U	NA	1 U	NA	1 U	NA
2-Butanone		2 U	NA	2 U	NA	2 U	NA
1,1,1-Trichloroethane		4	NA	4	NA	5	NA
Carbon Tetrachloride		1 U	NA	1 U	NA	1 U	NA
Vinyl acetate		2 U	NA	2 U	NA	2 U	NA
Bromodichloromethane		1 U	NA	1 U	NA	1 U	NA
1,2-Dichloropropane		1 U	NA	1 U	NA	1 U	NA
cis-1,3-Dichloropropene		1 U	NA	1 U	NA	1 U	NA
Trichloroethene		E	42	E	41	E	240
Dibromochloromethane		1 U	NA	1 U	NA	1 U	NA
1,1,2-Trichloroethane		1 U	NA	1 U	NA	1 U	NA
Benzene		1 U	NA	1 U	NA	1 U	NA
trans-1,3-Dichloropropene		1 U	NA	1 U	NA	1 U	NA
Bromoform		1 U	NA	1 U	NA	1 U	NA
4-Methyl-2-pentanone		2 U	NA	2 U	NA	2 U	NA
2-Hexanone		2 U	NA	2 U	NA	2 U	NA
Tetrachloroethene		1 U	NA	1 U	NA	1 U	NA
1,1,2,2-Tetrachloroethane		1 U	NA	1 U	NA	1 U	NA

*= Outside of EPA CLP QC limits.

Cust ID:	L-1	L-1	L-1 Dup	L-1 Dup	L-2	L-2
RFW#:	001	001 DL	002	002 DL	003	003 DL
Toluene	1 U	NA	1 U	NA	1 U	NA
Chlorobenzene	1 U	NA	1 U	NA	1 U	NA
Ethylbenzene	1 U	NA	1 U	NA	1 U	NA
Styrene	1 U	NA	1 U	NA	1 U	NA
Xylene (total)	1 U	NA	1 U	NA	1 U	NA

*= Outside of EPA CLP QC limits.

Roy F. Weston, Inc. - Gulf Coast Laboratories
VOLATILES BY GC/MS, HSL LIST

RFW Batch Number: 9405G855 Client: Ekco Houseware Work Order: 02994-002-005-9 Report Date: 05/20/94 11:11 Page: 2a

	Cust ID:	L-3		L-4		L-4		L-4		L-5		L-5	
Sample Information	RFW#:	004		005		005 MS		005 MSD		006		006 DL	
	Matrix:	WATER		WATER		WATER		WATER		WATER		WATER	
	D.F.:	1.0		1.0		1.0		1.0		1.0		10.0	
	Units:	ug/L		ug/L		ug/L		ug/L		ug/L		ug/L	
Surrogate Recovery	Toluene-d8	97	%	102	%	93	%	96	%	103	%	97	%
	Bromofluorobenzene	99	%	99	%	101	%	103	%	106	%	101	%
	1,2-Dichloroethane-d4	99	%	95	%	97	%	99	%	111	%	98	%
Chloromethane		2	U	2	U	2	U	2	U	2	U	NA	
Bromomethane		2	U	2	U	2	U	2	U	2	U	NA	
Vinyl chloride		1	U	1	U	1	U	1	U		E	51	
Chloroethane		2	U	2	U	2	U	2	U	2	U	NA	
Methylene Chloride		1	U	1	U	1	U	1	U	1	U	NA	
Acetone		4	B	3	B	3	B	2	U	16	B	NA	
Carbon disulfide		1	U	1	U	1	U	1	U	1	U	NA	
1,1-Dichloroethene		1	U	1	U	101	%	100	%	1	U	NA	
1,1-Dichloroethane		1	U	6		5		5		18		NA	
1,2-Dichloroethene (total)		1	U	21		19		20		33		NA	
Chloroform		1	U	1	U	1	U	1	U	1	U	NA	
1,2-Dichloroethane		1	U	1	U	1	U	1	U	1	U	NA	
2-Butanone		2	U	2	U	2	U	2	U	2	U	NA	
1,1,1-Trichloroethane		1	U	1	U	1	U	1	U	1	U	NA	
Carbon Tetrachloride		1	U	1	U	1	U	1	U	1	U	NA	
Vinyl acetate		2	U	2	U	2	U	2	U	2	U	NA	
Bromodichloromethane		1	U	1	U	1	U	1	U	1	U	NA	
1,2-Dichloropropane		1	U	1	U	1	U	1	U	1	U	NA	
cis-1,3-Dichloropropene		1	U	1	U	1	U	1	U	1	U	NA	
Trichloroethene		1	U	1	U	97	%	98	%	1	U	NA	
Dibromochloromethane		1	U	1	U	1	U	1	U	1	U	NA	
1,1,2-Trichloroethane		1	U	1	U	1	U	1	U	1	U	NA	
Benzene		1	U	1	U	104	%	106	%	1	U	NA	
trans-1,3-Dichloropropene		1	U	1	U	1	U	1	U	1	U	NA	
Bromoform		1	U	1	U	1	U	1	U	1	U	NA	
4-Methyl-2-pentanone		2	U	2	U	2	U	2	U	2	U	NA	
2-Hexanone		2	U	2	U	2	U	2	U	2	U	NA	
Tetrachloroethene		1	U	1	U	1	U	1	U	1	U	NA	
1,1,2,2-Tetrachloroethane		1	U	1	U	1	U	1	U	1	U	NA	

*= Outside of EPA CLP QC limits.

Cust ID:	L-3	L-4	L-4	L-4	L-5	L-5
RFW#:	004	005	005 MS	005 MSD	006	006 DL
Toluene	1 U	1 U	94 %	95 %	1 U	NA
Chlorobenzene	1 U	1 U	96 %	97 %	1 U	NA
Ethylbenzene	1 U	1 U	1 U	1 U	1 U	NA
Styrene	1 U	1 U	1 U	1 U	1 U	NA
Xylene (total)	1 U	1 U	1 U	1 U	1 U	NA

*= Outside of EPA CLP QC limits.

AHP On-Site Shallow Wells
Minimum and Average DTWs - 1994
10/28/94

Well	TOC	GL	Stick-Up	2/15/94 DTW TOC	2/15/94 DTW BGL	5/3/94 DTW TOC	5/3/94 DTW BGL	8/10/94 DTW TOC	8/10/94 DTW BGL	DTW BGL Arithmetic Mean
L-1	946.33	944.2	2.13	20.68	**18.55**	20.75	**18.62**	24.65	**22.52**	**19.90**
L-2	947.57	946.2	1.37	17.49	**16.12**	15.38	**14.01**	17.11	**15.74**	**15.29**
L-3	946.91	946.0	0.91	15.25	**14.34**	14.54	**13.63**	16.52	**15.61**	**14.53**
L-4	938.22	935.9	2.32	8.28	**5.96**	8.08	**5.76**	8.45	**6.13**	**5.95**
L-5	936.98	934.7	2.28	7.67	**5.39**	7.39	**5.11**	7.85	**5.57**	**5.36**
S-4	934.88	932.3	2.58	10.51	**7.93**	9.98	**7.40**	11.43	**8.85**	**8.06**
P-5	948.43	946.2	2.23	21.22	**18.99**	19.59	**17.36**	21.17	**18.94**	**18.43**

TOC - Top of casing
GL - Ground Level
DTW - Depth to water
BGL - Below ground level

DTW BGL Arithmetic Mean of all wells 12.50

Roy F. Weston, Inc. - Gulf Coast Laboratories
VOLATILES BY GC/MS, HSL LIST
Report Date: 05/20/94 11:11

RFW Batch Number: 9405G855 Client: Ekco Houseware Work Order: 02994-002-005-9 Page: 3a

	Cust ID:	R-1		R-2		R-2		R-3		R-3		R-5	
Sample Information	RFW#:	007		008		008 DL		009		009 DL		010	
	Matrix:	WATER		WATER		WATER		WATER		WATER		WATER	
	D.F.:	1.0		1.0		5.0		1.0		20.0		1.0	
	Units:	ug/L		ug/L		ug/L		ug/L		ug/L		ug/L	
	Toluene-d8	96	%	100	%	104	%	105	%	108	%	98	%
Surrogate Recovery	Bromofluorobenzene	102	%	98	%	106	%	101	%	111	%	106	%
	1,2-Dichloroethane-d4	100	%	98	%	110	%	105	%	112	%	111	%
Chloromethane		2	U	2	U	NA		2	U	NA		2	U
Bromomethane		2	U	2	U	NA		2	U	NA		2	U
Vinyl chloride		1	U	1	U	NA		1	U	NA		15	
Chloroethane		2	U	2	U	NA		2	U	NA		2	U
Methylene Chloride		1	U	1	U	NA		1	U	NA		1	U
Acetone		2	U	5	BU	NA		2	U	NA		2	U
Carbon disulfide		1	U	1	U	NA		1	U	NA		1	U
1,1-Dichloroethene		1	U	1		NA		16		NA		1	U
1,1-Dichloroethane		1	U	12		NA			E	150		2	
1,2-Dichloroethene (total)		1	U		E	66		4		NA		17	
Chloroform		1	U	1	U	NA		1	U	NA		1	U
1,2-Dichloroethane		1	U	1	U	NA		1	U	NA		1	U
2-Butanone		2	U	2	U	NA		2	U	NA		2	U
1,1,1-Trichloroethane		5		1	U	NA			E	~~NA~~ 70		1	U
Carbon Tetrachloride		1	U	1	U	NA		1	U	NA		1	U
Vinyl acetate		2	U	2	U	NA		2	U	NA		2	U
Bromodichloromethane		1	U	1	U	NA		1	U	NA		1	U
1,2-Dichloropropane		1	U	1	U	NA		1	U	NA		1	U
cis-1,3-Dichloropropene		1	U	1	U	NA		1	U	NA		1	U
Trichloroethene		9		21		NA			E	81		5	
Dibromochloromethane		1	U	1	U	NA		1	U	NA		1	U
1,1,2-Trichloroethane		1	U	1	U	NA		1	U	NA		1	U
Benzene		1	U	1	U	NA		1	U	NA		1	U
trans-1,3-Dichloropropene		1	U	1	U	NA		1	U	NA		1	U
Bromoform		1	U	1	U	NA		1	U	NA		1	U
4-Methyl-2-pentanone		2	U	2	U	NA		2	U	NA		2	U
2-Hexanone		2	U	2	U	NA		2	U	NA		2	U
Tetrachloroethene		1	U	1	U	NA		1	U	NA		1	U
1,1,2,2-Tetrachloroethane		1	U	1	U	NA		1	U	NA		1	U

*= Outside of EPA CLP QC limits.

Cust ID:	R-1	R-2	R-2	R-3	R-3	R-5
RFW#:	007	008	008 DL	009	009 DL	010
Toluene	1 U	1 U	NA	1 U	NA	1 U
Chlorobenzene	1 U	1 U	NA	1 U	NA	1 U
Ethylbenzene	1 U	1 U	NA	1 U	NA	1 U
Styrene	1 U	1 U	NA	1 U	NA	1 U
Xylene (total)	1 U	1 U	NA	1 U	NA	1 U

*= Outside of EPA CLP QC limits.

Roy F. Weston, Inc. - Gulf Coast Laboratories
VOLATILES BY GC/MS, HSL LIST
Report Date: 06/22/94 09:50

RFW Batch Number: 9405G855 Client: Ekco Houseware Work Order: 02994-002-005-9 Page: 3a

	Cust ID:	R-1		R-2		R-2		R-3		R-3		R-5	
Sample Information	RFW#:	007		008		008 DL		009		009 DL		010	
	Matrix:	WATER		WATER		WATER		WATER		WATER		WATER	
	D.F.:	1.0		1.0		5.0		1.0		20.0		1.0	
	Units:	ug/L		ug/L		ug/L		ug/L		ug/L		ug/L	
Surrogate Recovery	Toluene-d8	96	%	100	%	104	%	105	%	108	%	98	%
	Bromofluorobenzene	102	%	98	%	106	%	101	%	111	%	106	%
	1,2-Dichloroethane-d4	100	%	98	%	110	%	105	%	112	%	111	%
Chloromethane		2	U	2	U	NA		2	U	NA		2	U
Bromomethane		2	U	2	U	NA		2	U	NA		2	U
Vinyl chloride		1	U	1	U	NA		1	U	NA		15	
Chloroethane		2	U	2	U	NA		2	U	NA		2	U
Methylene Chloride		1	U	1	U	NA		1	U	NA		1	U
Acetone		2	U	5	B	NA		2	U	NA		2	U
Carbon disulfide		1	U	1	U	NA		1	U	NA		1	U
1,1-Dichloroethene		1	U	1		NA		16		NA		1	U
1,1-Dichloroethane		1	U	12		NA			E	150		2	
1,2-Dichloroethene (total)		1	U		E	66		4		NA		17	
Chloroform		1	U	1	U	NA		1	U	NA		1	U
1,2-Dichloroethane		1	U	1	U	NA		1	U	NA		1	U
2-Butanone		2	U	2	U	NA		2	U	NA		2	U
1,1,1-Trichloroethane		5		1	U	NA			E	70		1	U
Carbon Tetrachloride		1	U	1	U	NA		1	U	NA		1	U
Vinyl acetate		2	U	2	U	NA		2	U	NA		2	U
Bromodichloromethane		1	U	1	U	NA		1	U	NA		1	U
1,2-Dichloropropane		1	U	1	U	NA		1	U	NA		1	U
cis-1,3-Dichloropropene		1	U	1	U	NA		1	U	NA		1	U
Trichloroethene		9		21		NA			E	81		5	
Dibromochloromethane		1	U	1	U	NA		1	U	NA		1	U
1,1,2-Trichloroethane		1	U	1	U	NA		1	U	NA		1	U
Benzene		1	U	1	U	NA		1	U	NA		1	U
trans-1,3-Dichloropropene		1	U	1	U	NA		1	U	NA		1	U
Bromoform		1	U	1	U	NA		1	U	NA		1	U
4-Methyl-2-pentanone		2	U	2	U	NA		2	U	NA		2	U
2-Hexanone		2	U	2	U	NA		2	U	NA		2	U
Tetrachloroethene		1	U	1	U	NA		1	U	NA		1	U
1,1,2,2-Tetrachloroethane		1	U	1	U	NA		1	U	NA		1	U

*= Outside of EPA CLP QC limits.

Cust ID:	R-1	R-2	R-2	R-3	R-3	R-5
RFW#:	007	008	008 DL	009	009 DL	010
Toluene	1 U	1 U	NA	1 U	NA	1 U
Chlorobenzene	1 U	1 U	NA	1 U	NA	1 U
Ethylbenzene	1 U	1 U	NA	1 U	NA	1 U
Styrene	1 U	1 U	NA	1 U	NA	1 U
Xylene (total)	1 U	1 U	NA	1 U	NA	1 U

*= Outside of EPA CLP QC limits.

Roy F. Weston, Inc. - Gulf Coast Laboratories
VOLATILES BY GC/MS, HSL LIST

RFW Batch Number: 9405G855 Client: Ekco Houseware Work Order: 02994-002-005-9 Report Date: 05/20/94 11:11 Page: 4a

	Cust ID:	FB-L-1	TB050294	VBLK	VBLK BS	VBLK BSD	VBLK
Sample Information	RFW#:	011	012	94GVB164-MB1	94GVB164-MB1	94GVB164-MB1	94GVB165-MB1
	Matrix:	WATER	WATER	WATER	WATER	WATER	WATER
	D.F.:	1.0	1.0	1.0	1.0	1.0	1.0
	Units:	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
Surrogate Recovery	Toluene-d8	104 %	100 %	100 %	104 %	98 %	103 %
	Bromofluorobenzene	110 %	107 %	97 %	104 %	99 %	102 %
	1,2-Dichloroethane-d4	110 %	108 %	99 %	100 %	98 %	105 %
Chloromethane		2 U	2 U	2 U	2 U	2 U	2 U
Bromomethane		2 U	2 U	2 U	2 U	2 U	2 U
Vinyl chloride		1 U	1 U	1 U	1 U	1 U	1 U
Chloroethane		2 U	2 U	2 U	2 U	2 U	2 U
Methylene Chloride		1 U	1 U	1 U	1 U	1 U	1 U
Acetone		2 U	4 B	5	4 B	4 B	5
Carbon disulfide		1 U	1 U	1 U	1 U	1 U	1 U
1,1-Dichloroethene		1 U	1 U	1 U	108 %	95 %	1 U
1,1-Dichloroethane		1 U	1 U	1 U	1 U	1 U	1 U
1,2-Dichloroethene (total)		1 U	1 U	1 U	1 U	1 U	1 U
Chloroform		1 U	1 U	1 U	1 U	1 U	1 U
1,2-Dichloroethane		1 U	1 U	1 U	1 U	1 U	1 U
2-Butanone		2 U	2 U	2 U	2 U	2 U	2 U
1,1,1-Trichloroethane		1 U	1 U	1 U	1 U	1 U	1 U
Carbon Tetrachloride		1 U	1 U	1 U	1 U	1 U	1 U
Vinyl acetate		2 U	2 U	2 U	2 U	2 U	2 U
Bromodichloromethane		1 U	1 U	1 U	1 U	1 U	1 U
1,2-Dichloropropane		1 U	1 U	1 U	1 U	1 U	1 U
cis-1,3-Dichloropropene		1 U	1 U	1 U	1 U	1 U	1 U
Trichloroethene		1 U	1 U	1 U	96 %	95 %	1 U
Dibromochloromethane		1 U	1 U	1 U	1 U	1 U	1 U
1,1,2-Trichloroethane		1 U	1 U	1 U	1 U	1 U	1 U
Benzene		1 U	1 U	1 U	108 %	108 %	1 U
trans-1,3-Dichloropropene		1 U	1 U	1 U	1 U	1 U	1 U
Bromoform		1 U	1 U	1 U	1 U	1 U	1 U
4-Methyl-2-pentanone		2 U	2 U	2 U	2 U	2 U	2 U
2-Hexanone		2 U	2 U	2 U	2 U	2 U	2 U
Tetrachloroethene		1 U	1 U	1 U	1 U	1 U	1 U
1,1,2,2-Tetrachloroethane		1 U	1 U	1 U	1 U	1 U	1 U

*= Outside of EPA CLP QC limits.

Cust ID:	FB-L-1	TB050294	VBLK	VBLK BS	VBLK BSD	VBLK
RFW#:	011	012	94GVB164-MB1	94GVB164-MB1	94GVB164-MB1	94GVB165-MB1
Toluene	1 U	1 U	1 U	104 %	96 %	1 U
Chlorobenzene	1 U	1 U	1 U	100 %	95 %	1 U
Ethylbenzene	1 U	1 U	1 U	1 U	1 U	1 U
Styrene	1 U	1 U	1 U	1 U	1 U	1 U
Xylene (total)	1 U	1 U	1 U	1 U	1 U	1 U

*= Outside of EPA CLP QC limits.

Roy F. Weston, Inc. - Gulf Coast Laboratories
VOLATILES BY GC/MS, HSL LIST

RFW Batch Number: 9405G855 Client: Ekco Houseware Work Order: 02994-002-005-9 Report Date: 05/20/94 11:11 Page: 5a

	Cust ID:	VBLK BS		VBLK BSD	
Sample Information	RFW#:	94GVB165-MB1		94GVB165-MB1	
	Matrix:	WATER		WATER	
	D.F.:	1.0		1.0	
	Units:	ug/L		ug/L	
Surrogate Recovery	Toluene-d8	104	%	99	%
	Bromofluorobenzene	108	%	104	%
	1,2-Dichloroethane-d4	110	%	109	%
Chloromethane		2	U	2	U
Bromomethane		2	U	2	U
Vinyl chloride		1	U	1	U
Chloroethane		2	U	2	U
Methylene Chloride		1	U	1	U
Acetone		4	B	5	B
Carbon disulfide		1	U	1	U
1,1-Dichloroethene		118	%	105	%
1,1-Dichloroethane		1	U	1	U
1,2-Dichloroethene (total)		1	U	1	U
Chloroform		1	U	1	U
1,2-Dichloroethane		1	U	1	U
2-Butanone		2	U	2	U
1,1,1-Trichloroethane		1	U	1	U
Carbon Tetrachloride		1	U	1	U
Vinyl acetate		2	U	2	U
Bromodichloromethane		1	U	1	U
1,2-Dichloropropane		1	U	1	U
cis-1,3-Dichloropropene		1	U	1	U
Trichloroethene		103	%	102	%
Dibromochloromethane		1	U	1	U
1,1,2-Trichloroethane		1	U	1	U
Benzene		112	%	114	%
trans-1,3-Dichloropropene		1	U	1	U
Bromoform		1	U	1	U
4-Methyl-2-pentanone		2	U	2	U
2-Hexanone		2	U	2	U
Tetrachloroethene		1	U	1	U
1,1,2,2-Tetrachloroethane		1	U	1	U

*= Outside of EPA CLP QC limits.

FACSIMILE TRANSMITTAL
Glenloch 2S
FAX 610-701-7597

WESTON
MANAGERS DESIGNERS/CONSULTANTS
Roy F. Weston, Inc.
1 Weston Way
West Chester, Pennsylvania 19380-1499
tel 610-701-3000 • Fax 610-701-3186

TO: Pat Cunningham

Recipient's Telecopy Telephone # _____

FROM: Tim Farrell

Originator's Telephone #

TOTAL PAGES: _____ (incl. cover sheet)

W.O. #: _____

COMMENTS: EKLO W-well data

EKCO.
HOUSEWARES, INC.

May 5, 1994

Mr. Dennis Lee
Ohio Environmental Protection Agency
Northeast District Office
2110 East Aurora Road
Twinsburg, Ohio 44087

Dear Mr. Lee:

Enclosed please find Ekco Housewares, Inc. Groundwater Reclamation Project Report. This report is complete and includes actual analysis from Wadsworth Laboratory.

Sincerely,

EKCO HOUSEWARES, INC.

Jeffrey L. Burman
Process Engineering Manager

Enclosures

JLB/baz

Report #100

cc: Paul Tag, Plant Manager
Ekco Housewares, Inc.
Massillon, Ohio

Harold Byer
Roy F. Weston, Inc.
West Chester, Pennsylvania

Daniel Schiltz
Ohio Air Pollution Division
Canton, Ohio
(Analysis Log - Air Stripper Only)

Sally Averill
U.S. Environmental Protection Agency
Chicago, Illinois

Robert Zollner
American Home Products
New York, New York

EKCO HOUSEWARES CO.

MR01 W-10" WELL 4-19-94 10:00

WO #: M2397101
LAB #: A4D190023-001
MATRIX: WATER

DATE SAMPLED: 4/19/94
DATE RECEIVED: 4/19/94

GC/MS Volatiles

1 OF 2

PARAMETER	RESULT (ug/L)	REPORTING LIMIT	METHOD	EXTRACTION-ANALYSIS DATE	QC BATCH
Acrolein	ND	500	USEPA 624	04/20/94	4110117
Acrylonitrile	ND	500	USEPA 624	04/20/94	4110117
Benzene	ND	50	USEPA 624	04/20/94	4110117
Bromodichloromethane	ND	50	USEPA 624	04/20/94	4110117
Bromoform	ND	50	USEPA 624	04/20/94	4110117
Bromomethane	ND	100	USEPA 624	04/20/94	4110117
Carbon tetrachloride	ND	50	USEPA 624	04/20/94	4110117
Chlorobenzene	ND	50	USEPA 624	04/20/94	4110117
Dibromochloromethane	ND	50	USEPA 624	04/20/94	4110117
Chloroethane	ND	100	USEPA 624	04/20/94	4110117
2-Chloroethyl vinyl ether	ND	100	USEPA 624	04/20/94	4110117
Chloroform	ND	50	USEPA 624	04/20/94	4110117
Chloromethane	ND	100	USEPA 624	04/20/94	4110117
1,2-Dichlorobenzene	ND	50	USEPA 624	04/20/94	4110117
1,3-Dichlorobenzene	ND	50	USEPA 624	04/20/94	4110117
1,4-Dichlorobenzene	ND	50	USEPA 624	04/20/94	4110117
1,1-Dichloroethane	91	50	USEPA 624	04/20/94	4110117
1,2-Dichloroethane	ND	50	USEPA 624	04/20/94	4110117
1,1-Dichloroethene	56	50	USEPA 624	04/20/94	4110117
1,2-Dichloroethene, Total	260	50	USEPA 624	04/20/94	4110117
1,2-Dichloropropane	ND	50	USEPA 624	04/20/94	4110117
cis-1,3-Dichloropropene	ND	50	USEPA 624	04/20/94	4110117
trans-1,3-Dichloropropene	ND	50	USEPA 624	04/20/94	4110117
Ethylbenzene	ND	50	USEPA 624	04/20/94	4110117

SURROGATE RECOVERY	%	ACCEPTABLE LIMITS
1,2-Dichloroethane-d4	84	(73 - 118)
Toluene-d8	98	(92 - 109)
Bromofluorobenzene	99	(85 - 108)

NOTE AS RECEIVED
ND NOT DETECTED AT THE STATED REPORTING LIMIT

*

EXCO HOUSEWARES CO.

MR01 W-10* WELL 4-19-94 10:00

WO #: M2397101
LAB #: A4D190023-001
MATRIX: WATER

DATE SAMPLED: 4/19/94
DATE RECEIVED: 4/19/94

GC/MS Volatiles
2 OF 2

PARAMETER	RESULT (ug/L)	REPORTING LIMIT	METHOD	EXTRACTION-ANALYSIS DATE	QC BATCH
Trichlorofluoromethane	ND	50	USEPA 624	04/20/94	4110117
Methylene chloride	ND	50	USEPA 624	04/20/94	4110117
1,1,2,2-Tetrachloroethane	ND	50	USEPA 624	04/20/94	4110117
Tetrachloroethene	ND	50	USEPA 624	04/20/94	4110117
Toluene	ND	50	USEPA 624	04/20/94	4110117
1,1,1-Trichloroethane	1,200	50	USEPA 624	04/20/94	4110117
1,1,2-Trichloroethane	ND	50	USEPA 624	04/20/94	4110117
Trichloroethene	430	50	USEPA 624	04/20/94	4110117
Xylenes, Total	ND	50	USEPA 624	04/20/94	4110117

SURROGATE RECOVERY	%	ACCEPTABLE LIMITS
1,2-Dichloroethane-d4	84	(73 - 116)
Toluene-d8	98	(92 - 109)
Bromofluorobenzene	99	(85 - 108)

NOTE: AS RECEIVED
ND NOT DETECTED AT THE STATED REPORTING LIMIT

*

EXCO HOUSEMARKS CO.

MR01 W-10" WELL 4-19-94 10:00

WO #: M2397102
LAB #: A4D190023-001
MATRIX: WATER

DATE SAMPLED: 4/19/94
DATE RECEIVED: 4/19/94

GC/MS Volatiles

PARAMETER	RESULT (ug/L)	REPORTING LIMIT	METHOD	EXTRACTION-ANALYSIS DATE	QC BATCH
Vinyl chloride	3.3	1.0	USEPA 624M	04/20/94	4111094

SURROGATE RECOVERY	%	ACCEPTABLE LIMITS
Bromofluorobenzene	101	(86 - 115)
1,2-Dichloroethane-d4	90	(76 - 114)
Toluene-d8	98	(88 - 110)

NOTE: AS RECEIVED

*

2040 ug/L

EKCO HOUSEWARES CO.

MR02 SOUTH WELL 4-19-94 10:00

WO #: M2398101
LAB #: A4D190023-002
MATRIX: WATER

W-1

DATE SAMPLED: 4/19/
DATE RECEIVED: 4/19/

GC/MS Volatiles
1 OF 2

PARAMETER	RESULT (ug/L)	REPORTING LIMIT	METHOD	EXTRACTION-ANALYSIS DATE	QC BAT
Acrolein	ND	50	USEPA 624	04/20/94	411(
Acrylonitrile	ND	50	USEPA 624	04/20/94	411(
Benzene	ND	5.0	USEPA 624	04/20/94	411(
Bromodichloromethane	ND	5.0	USEPA 624	04/20/94	411(
Bromoform	ND	5.0	USEPA 624	04/20/94	411(
Bromomethane	ND	10	USEPA 624	04/20/94	411(
Carbon tetrachloride	ND	5.0	USEPA 624	04/20/94	411(
Chlorobenzene	ND	5.0	USEPA 624	04/20/94	411(
Dibromochloromethane	ND	5.0	USEPA 624	04/20/94	411(
Chloroethane	ND	10	USEPA 624	04/20/94	411(
2-Chloroethyl vinyl ether	ND	10	USEPA 624	04/20/94	411(
Chloroform	ND	5.0	USEPA 624	04/20/94	411(
Chloromethane	ND	10	USEPA 624	04/20/94	411(
1,2-Dichlorobenzene	ND	5.0	USEPA 624	04/20/94	411(
1,3-Dichlorobenzene	ND	5.0	USEPA 624	04/20/94	411(
1,4-Dichlorobenzene	ND	5.0	USEPA 624	04/20/94	411(
1,1-Dichloroethane	59	5.0	USEPA 624	04/20/94	411(
1,2-Dichloroethane	ND	5.0	USEPA 624	04/20/94	411(
1,1-Dichloroethene	6.4	5.0	USEPA 624	04/20/94	411(
1,2-Dichloroethene, Total	6.7	5.0	USEPA 624	04/20/94	411(
1,2-Dichloropropane	ND	5.0	USEPA 624	04/20/94	411(
cis-1,3-Dichloropropene	ND	5.0	USEPA 624	04/20/94	411(
trans-1,3-Dichloropropene	ND	5.0	USEPA 624	04/20/94	411(
Ethylbenzene	ND	5.0	USEPA 624	04/20/94	411(

SURROGATE RECOVERY	%	ACCEPTABLE LIMITS
1,2-Dichloroethane-d4	88	(73 - 118)
Toluene-d8	102	(92 - 109)
Bromofluorobenzene	98	(85 - 108)

NOTE: AS RECEIVED
ND NOT DETECTED AT THE STATED REPORTING LIMIT

*

EKCO HOUSEWARES CO.

MR02 SOUTH WELL 4-19-94 10:00

WO #: M2398101
LAB #: A4D190023-002
MATRIX: WATER

W-1

DATE SAMPLED: 4/19/
DATE RECEIVED: 4/19/

GC/MS Volatiles

2 OF 2

PARAMETER	RESULT (ug/L)	REPORTING LIMIT	METHOD	EXTRACTION-ANALYSIS DATE	QC BAT
Trichlorofluoromethane	ND	5.0	USEPA 624	04/20/94	411
Methylene chloride	ND	5.0	USEPA 624	04/20/94	411
1,1,2,2-Tetrachloroethane	ND	5.0	USEPA 624	04/20/94	411
Tetrachloroethene	ND	5.0	USEPA 624	04/20/94	411
Toluene	ND	5.0	USEPA 624	04/20/94	411
1,1,1-Trichloroethane	23	5.0	USEPA 624	04/20/94	411
1,1,2-Trichloroethane	ND	5.0	USEPA 624	04/20/94	411
Trichloroethene	46	5.0	USEPA 624	04/20/94	411
Xylenes, Total	ND	5.0	USEPA 624	04/20/94	411

SURROGATE RECOVERY	%	ACCEPTABLE LIMITS
1,2-Dichloroethane-d4	88	(73 - 116)
Toluene-d8	102	(92 - 109)
Bromofluorobenzene	98	(85 - 108)

NOTE: AS RECEIVED
ND NOT DETECTED AT THE STATED REPORTING LIMIT

*

EXCO HOUSEWARES CO.

MR02 SOUTH WELL 4-19-94 10:00

WO #: M2292102
LAB #: A4D190023-002
MATRIX: WATER

W-1

DATE SAMPLED: 4/19/94
DATE RECEIVED: 4/19/94

GC/MS Volatiles

PARAMETER	RESULT (ug/L)	REPORTING LIMIT	METHOD	EXTRACTION-ANALYSIS DATE	QC BATCH
Vinyl chloride	ND	1.0	USEPA 624M	04/20/94	4111094

SURROGATE RECOVERY	%	ACCEPTABLE LIMITS
Bromofluorobenzene	107	(86 - 115)
1,2-Dichloroethane-d4	101	(76 - 114)
Toluene-d8	99	(88 - 110)

NOTE: AS RECEIVED
ND NOT DETECTED AT THE STATED REPORTING LIMIT

*

141 ug/L

EKCO HOUSEWARES CO.

MR03 EFFLUENT FROM AIR STRIPPER 4-19-94 10:00

WO #: M2399101
LAB #: A4D190023-003
MATRIX: WATER

DATE SAMPLED: 4/19/94
DATE RECEIVED: 4/19/94

GC/MS Volatiles
1 OF 2

PARAMETER	RESULT (ug/L)	REPORTING LIMIT	METHOD	EXTRACTION-ANALYSIS DATE	QC BATCH
Acrolein	ND	50	USEPA 624	04/20/94	4110117
Acrylonitrile	ND	50	USEPA 624	04/20/94	4110117
Benzene	ND	5.0	USEPA 624	04/20/94	4110117
Bromodichloromethane	ND	5.0	USEPA 624	04/20/94	4110117
Bromoform	ND	5.0	USEPA 624	04/20/94	4110117
Bromomethane	ND	10	USEPA 624	04/20/94	4110117
Carbon tetrachloride	ND	5.0	USEPA 624	04/20/94	4110117
Chlorobenzene	ND	5.0	USEPA 624	04/20/94	4110117
Dibromochloromethane	ND	5.0	USEPA 624	04/20/94	4110117
Chloroethane	ND	10	USEPA 624	04/20/94	4110117
2-Chloroethyl vinyl ether	ND	10	USEPA 624	04/20/94	4110117
Chloroform	ND	5.0	USEPA 624	04/20/94	4110117
Chloromethane	ND	10	USEPA 624	04/20/94	4110117
1,2-Dichlorobenzene	ND	5.0	USEPA 624	04/20/94	4110117
1,3-Dichlorobenzene	ND	5.0	USEPA 624	04/20/94	4110117
1,4-Dichlorobenzene	ND	5.0	USEPA 624	04/20/94	4110117
1,1-Dichloroethane	ND	5.0	USEPA 624	04/20/94	4110117
1,2-Dichloroethane	ND	5.0	USEPA 624	04/20/94	4110117
1,1-Dichloroethene	ND	5.0	USEPA 624	04/20/94	4110117
1,2-Dichloroethene, Total	ND	5.0	USEPA 624	04/20/94	4110117
1,2-Dichloropropane	ND	5.0	USEPA 624	04/20/94	4110117
cis-1,3-Dichloropropene	ND	5.0	USEPA 624	04/20/94	4110117
trans-1,3-Dichloropropene	ND	5.0	USEPA 624	04/20/94	4110117
Ethylbenzene	ND	5.0	USEPA 624	04/20/94	4110117

SURROGATE RECOVERY	%	ACCEPTABLE LIMITS
1,2-Dichloroethane-d4	89	(73 - 118)
Toluene-d8	98	(92 - 109)
Bromofluorobenzene	100	(85 - 108)

NOTE: AS RECEIVED
ND NOT DETECTED AT THE STATED REPORTING LIMIT

*

EXCO HOUSEWARES CO.

MR03 EFFLUENT FROM AIR STRIPPER 4-19-94 10:00

WO #: M2399101
LAB #: A4D190023-003
MATRIX: WATER

DATE SAMPLED: 4/19/94
DATE RECEIVED: 4/19/94

GC/MS Volatiles
2 OF 2

PARAMETER	RESULT (ug/L)	REPORTING LIMIT	METHOD	EXTRACTION-ANALYSIS DATE	QC BATCH
Trichlorofluoromethane	ND	5.0	USEPA 624	04/20/94	4110117
Methylene chloride	ND	5.0	USEPA 624	04/20/94	4110117
1,1,2,2-Tetrachloroethane	ND	5.0	USEPA 624	04/20/94	4110117
Tetrachloroethene	ND	5.0	USEPA 624	04/20/94	4110117
Toluene	ND	5.0	USEPA 624	04/20/94	4110117
1,1,1-Trichloroethane	ND	5.0	USEPA 624	04/20/94	4110117
1,1,2-Trichloroethane	ND	5.0	USEPA 624	04/20/94	4110117
Trichloroethene	ND	5.0	USEPA 624	04/20/94	4110117
Xylenes, Total	ND	5.0	USEPA 624	04/20/94	4110117

SURROGATE RECOVERY	%	ACCEPTABLE LIMITS
1,2-Dichloroethane-d4	89	(73 - 118)
Toluene-d8	98	(92 - 109)
Bromofluorobenzene	100	(85 - 108)

NOTE: AS RECEIVED
ND NOT DETECTED AT THE STATED REPORTING LIMIT

*

EKCO HOUSEWARES CO.

MR03 EFFLUENT FROM AIR STRIPPER 4-19-94 10:00

WO #: MZ399102 **DATE SAMPLED:** 4/19/94
LAB #: A4D190023-003 **DATE RECEIVED:** 4/19/94
MATRIX: WATER

GC/MS Volatiles

PARAMETER	RESULT (ug/L)	REPORTING LIMIT	METHOD	EXTRACTION-ANALYSIS DATE	QC BATCH
Vinyl chloride	ND	1.0	USEPA 624M	04/20/94	4111094

SURROGATE RECOVERY	%	ACCEPTABLE LIMITS
Bromofluorobenzene	104	(86 - 115)
1,2-Dichloroethane-d4	95	(76 - 114)
Toluene-d8	97	(88 - 110)

NOTE: AS RECEIVED
ND NOT DETECTED AT THE STATED REPORTING LIMIT

ND

*

SECO HOUSEWARES CO.

MR04 OUTFALL #001 4-19-94 10:00

WO #: M2400101
LAB #: A4D190023-004
MATRIX: WATER

DATE SAMPLED: 4/19/94
DATE RECEIVED: 4/19/94

GC/MS Volatiles 1 OF 2

PARAMETER	RESULT (ug/L)	REPORTING LIMIT	METHOD	EXTRACTION-ANALYSIS DATE	QC BATCH
Acrolein	ND	50	USEPA 624	04/20/94	4110117
Acrylonitrile	ND	50	USEPA 624	04/20/94	4110117
Benzene	ND	5.0	USEPA 624	04/20/94	4110117
Bromodichloromethane	ND	5.0	USEPA 624	04/20/94	4110117
Bromoform	ND	5.0	USEPA 624	04/20/94	4110117
Bromomethane	ND	10	USEPA 624	04/20/94	4110117
Carbon tetrachloride	ND	5.0	USEPA 624	04/20/94	4110117
Chlorobenzene	ND	5.0	USEPA 624	04/20/94	4110117
Dibromochloromethane	ND	5.0	USEPA 624	04/20/94	4110117
Chloroethane	ND	10	USEPA 624	04/20/94	4110117
2-Chloroethyl vinyl ether	ND	10	USEPA 624	04/20/94	4110117
Chloroform	ND	5.0	USEPA 624	04/20/94	4110117
Chloromethane	ND	10	USEPA 624	04/20/94	4110117
1,2-Dichlorobenzene	ND	5.0	USEPA 624	04/20/94	4110117
1,3-Dichlorobenzene	ND	5.0	USEPA 624	04/20/94	4110117
1,4-Dichlorobenzene	ND	5.0	USEPA 624	04/20/94	4110117
1,1-Dichloroethane	ND	5.0	USEPA 624	04/20/94	4110117
1,2-Dichloroethane	ND	5.0	USEPA 624	04/20/94	4110117
1,1-Dichloroethene	ND	5.0	USEPA 624	04/20/94	4110117
1,2-Dichloroethene, Total	ND	5.0	USEPA 624	04/20/94	4110117
1,2-Dichloropropane	ND	5.0	USEPA 624	04/20/94	4110117
cis-1,3-Dichloropropene	ND	5.0	USEPA 624	04/20/94	4110117
trans-1,3-Dichloropropene	ND	5.0	USEPA 624	04/20/94	4110117
Ethylbenzene	ND	5.0	USEPA 624	04/20/94	4110117

SURROGATE RECOVERY	%	ACCEPTABLE LIMITS
1,2-Dichloroethane-d4	88	(73 - 118)
Toluene-d8	98	(92 - 109)
Bromofluorobenzene	101	(85 - 108)

NOTE: AS RECEIVED
ND NOT DETECTED AT THE STATED REPORTING LIMIT

*

EKCO HOUSEWARES CO.

MR04 OUTFALL #001 4-19-94 10:00

WO #: M2400102
LAB #: A4D190023-004
MATRIX: WATER

DATE SAMPLED: 4/19/94
DATE RECEIVED: 4/19/94

GC/MS Volatiles

PARAMETER	RESULT (ug/L)	REPORTING LIMIT	METHOD	EXTRACTION-ANALYSIS DATE	QC BATCH
Vinyl chloride	ND	1.0	USEPA 624M	04/20/94	4111094

SURROGATE RECOVERY	%	ACCEPTABLE LIMITS
Bromofluorobenzene	100	(86 - 115)
1,2-Dichloroethane-d4	94	(76 - 114)
Toluene-d8	99	(88 - 110)

NOTE: AS RECEIVED
ND NOT DETECTED AT THE STATED REPORTING LIMIT

*

14 ug/L

EXCO HOUSEWARES CO.

MR04 OUTFALL #001 4-19-94 10:00

WO #: M2400101
LAB #: A4D190023-004
MATRIX: WATER

DATE SAMPLED: 4/19/94
DATE RECEIVED: 4/19/94

GC/MS Volatiles
2 OF 2

PARAMETER	RESULT (ug/L)	REPORTING LIMIT	METHOD	EXTRACTION-ANALYSIS DATE	QC BATCH
Trichlorofluoromethane	ND	5.0	USEPA 624	04/20/94	4110117
Methylene chloride	ND	5.0	USEPA 624	04/20/94	4110117
1,1,2,2-Tetrachloroethane	ND	5.0	USEPA 624	04/20/94	4110117
Tetrachloroethene	ND	5.0	USEPA 624	04/20/94	4110117
Toluene	ND	5.0	USEPA 624	04/20/94	4110117
1,1,1-Trichloroethane	11	5.0	USEPA 624	04/20/94	4110117
1,1,2-Trichloroethane	ND	5.0	USEPA 624	04/20/94	4110117
Trichloroethene	4.1 J	5.0	USEPA 624	04/20/94	4110117
Xylenes, Total	ND	5.0	USEPA 624	04/20/94	4110117

SURROGATE RECOVERY	%	ACCEPTABLE LIMITS
1,2-Dichloroethane-d4	88	(73 - 118)
Toluene-d8	98	(92 - 109)
Bromofluorobenzene	101	(85 - 108)

NOTE: AS RECEIVED
ND NOT DETECTED AT THE STATED REPORTING LIMIT
J ESTIMATED VALUE. DETECTED, BUT BELOW QUANTITATION LIMIT.

*

EKCO HOUSEWARES, INC. - MASSILLON, OHIO
SAMPLE ANALYSIS LOG

INFLUENT TO AIR STRIPPER	PUMPING RATE AT TIME OF SAMPLES	SOUTH WELL W-10" WELL ANALYSIS (Weigh'd Ave)	TOTAL WEIGHT OF VOC's TO ATMOSPHERE		EFFLUENT FROM AIR STRIPPER SAMPLES	PUMPING RATE AT TIME OF SAMPLES	SAMPLE ANALYSIS (ug/L)	TOTAL GAL. OF WATER TREATED TO DATE		OUTFALL #001 DISHCARGE SAMPLES	SAMPLE ANALYS (ug/L)
2-3-93	560GPM	1296.2	8.7 lbs.		2-3-93	560GPM	ND	20,962,900		2-3-93	16 ug/l
3-2-93	530GPM	862.4	5.5 lbs.		3-2-93	530GPM	ND	20,829,300		3-2-93	33 ug/l
4-1-93	540GPM	1191.0	8.0 lbs.		4-1-93	540GPM	22 ug/l	23,372,[illegible]		4-1-93	14 ug/l
5-3-93	540GPM	1004.0	7.0 lbs		5-3-93	540GPM	47 ug/l	25,321,000		5-3-93	371 ug
6-1-93	540GPM*	914.0*	10.3 lbs*		6-1-93	540GPM*	ND	22,031,000*		6-1-93	41 ug
7-1-93	535GPM	985.3	11.4 lbs		7-1-93	535GPM	13 ug/L	22,046,400		7-1-93	62 ug
8-9-93	515GPM	969.4	10.1 lbs		8-9-93	515GPM	ND	28,428,000		8-9-93	39 ug
9-2-93	490GPM	1070.6	10.6 lbs		9-2-93	490GPM	8 ug/L	16,360,400		9-2-93	44 ug
10-1-93	464GPM	1018.6	9 lbs		10-1-93	464GPM	4.6 ug/L	19,679,500		10-1-93	41 ug
11-3-93	494GPM*	1422*	8.4 lbs		11-3-93	494GPM	5 ug/L	18,044,200		11-3-93	63 ug
12-1-93	300GPM	1263	4.6 lbs		12-1-93	300GPM	ND	12,173,200		12-1-93	26 ug
1-13-94	590GPM	823	11.8 lbs		1-13-94	590GPM	2 ug/L	37,560,000		1-13-94	69 ug
2-14-94	440GPM	1238	10.1 lbs		2-14-94	440GPM	3 ug/L	22,841,800		2-14-94	47 ug
3-3-94	540GPM	1081	13.0 lbs		3-3-94	540GPM	ND	17,642,400		3-3-94	49 ug
4-19-94	535GPM	1170	14.0 lbs		4-19-94	535GPM	ND	26,097,200		4-19-94	15 ug

*Estimated (Pump meter #2 not working)
*Estimated (Southwell meter not working)
Weigh'd Avg for W-10 well only

EKCO HOUSEWARES, INC. - MASSILLON, OHIO
SAMPLE ANALYSIS LOG

SOUTH WELL SAMPLES	WATER LEVEL AT TIME OF SAMPLE	PUMPING RATE AT TIME OF SAMPLE	TOTAL GAL. OF WATER TREATED TO DATE	SAMPLE ANALYSIS (ug/L)		W-10" WELL SAMPLES	WATER LEVEL AT TIME OF SAMPLE	PUMPING RATE AT TIME OF SAMPLE	TOTAL GAL. OF WATER TREATED TO DATE	SAMPLE ANALYSIS (ug/L)
2-3-93	120'	245 GPM	9,013,000	133 ug/L		2-3-93	57'	315 GPM	11,389,000	2,162 ug/L
3-2-93	122'	230 GPM	9,065,000	135 ug/L		3-2-93	85'	300 GPM	11,744,300	1420 ug/L
4-1-93	125'	246 GPM	9,372,000	162 ug/L		4-1-93	87'	310 GPM	12,156,000	1954 ug/L
5-3-93	120'	235 GPM	10,938,000	136 ug/L		5-3-93	85'	305 GPM	14,383,000	1673 ug/L
6-1-93	115'	230 GPM	9,408,000	ND		6-1-93	68'	310 GPM*	12,623,000*	1592 ug/L
7-1-93	121'	235 GPM	9,553,000	124 ug/L		7-1-93	72'	300 GPM	12,493,900	1660 ug/L
8-9-93	105'	210 GPM	11,727,000	132 ug/L		8-9-93	85'	305 GPM	16,701,000	1546 ug/L
9-2-93	105'	190 GPM	6,655,000	140 ug/L		9-2-93	80'	300 GPM	10,205,000	1660 ug/L
10-1-93	100'	175 GPM	7,505,000	136 ug/L		10-1-93	80'	289 GPM	12,194,500	1486 ug/L
11-3-93	100'	t 200 GPM	t 7,005,000	*		11-3-93	75'	294 GPM	11,044,200	1422 ug/L
12-1-93	95'	Well not operational				12-1-93	75'	300 GPM	12,173,200	1263 ug/L
1-13-94	90'	300 GPM*	19,000,000*	136 ug/L		1-13-94	80'	290 GPM	18,560,500	1534 ug/L
2-14-94	90'	145 GPM	9,612,000	138 ug/L		2-14-94	72'	295 GPM	13,229,800	1779 ug/L
3-3-94	80'	245 GPM	10,584,000	144 ug/L		3-3-94	50'	295 GPM	7,058,400	1860 ug/L
4-19-94	125'	245 GPM	14,102,000	141 ug/L		4-19-94	80'	* 290 GPM	* 11,995,200	2040 ug/L

* Estimated (Pump meter #2 not working)
t meter not working (estimated)
Pump not functioning

RFW Batch Number: 9203G477 Client: Ekco Houseware Work Order: 2994-02-03-0000 Page: 1b

Cust ID:	I-7-GW	I-7-GW	I-8-GW	D-4-30-GW	D-4-30-GW	D-4-30-GW
RFW#:	001	001 DL	002	003	003 DL	003 DL
Toluene	1 U	NA	1 U	1 U	NA	NA
Chlorobenzene	1 U	NA	1 U	1 U	NA	NA
Ethylbenzene	1 U	NA	1 U	1 U	NA	NA
Styrene	1 U	NA	1 U	1 U	NA	NA
Xylene (total)	1 U	NA	1 U	1 U	NA	NA

*= Outside of EPA CLP QC limits.

Roy F. Weston, Inc. - Gulf Coast Laboratories
VOLATILES BY GC/MS, HSL LIST

RFW Batch Number: 9203G477 Client: Ekco Houseware Work Order: 2994-02-03-0000 Report Date: 04/20/92 10:51 Page: 1a

	Cust ID:	I-7-GW		I-7-GW		I-8-GW		D-4-30-GW		D-4-30-GW		D-4-30-GW	
Sample Information	RFW#:	001		001 DL		002		003		003 DL		003 DL	
	Matrix:	WATER		WATER		WATER		WATER		WATER		WATER	
	D.F.:	1.00		20.0		1.00		1.00		20.0		400	
	Units:	ug/L		ug/L		ug/L		ug/L		ug/L		ug/L	
Surrogate Recovery	Toluene-d8	99	%	94	%	104	%	106	%	99	%	101	%
	Bromofluorobenzene	102	%	94	%	99	%	84 *	%	96	%	100	%
	1,2-Dichloroethane-d4	83	%	89	%	77	%	83	%	98	%	94	%
Chloromethane		2	U	NA		2	U	2	U	NA		NA	
Bromomethane		2	U	NA		2	U	2	U	NA		NA	
Vinyl Chloride		1	U	NA		1	U	1	U	NA		NA	
Chloroethane		2	U	NA		2	U	2	U	NA		NA	
Methylene Chloride		3	U	NA		3		4	U	NA		NA	
Acetone		2	U	NA		2	U	2	U	NA		NA	
Carbon Disulfide		1	U	NA		1	U	1	U	NA		NA	
1,1-Dichloroethene		2		NA		1	U		E	910		NA	
1,1-Dichloroethane			E	140		1	U		E	110		NA	
1,2-Dichloroethene (total)		1	U	NA		1	U		E	130		NA	
Chloroform		1	U	NA		1	U	1		NA		NA	
1,2-Dichloroethane		1	U	NA		1	U	1	U	NA		NA	
2-Butanone		2	U	NA		2	U	2	U	NA		NA	
1,1,1-Trichloroethane		11		NA		1	U		E		E	9700	
Carbon Tetrachloride		1	U	NA		1	U	1	U	NA		NA	
Vinyl Acetate		2	U	NA		2	U	2	U	NA		NA	
Bromodichloromethane		1	U	NA		1	U	1	U	NA		NA	
1,2-Dichloropropane		1	U	NA		1	U	1	U	NA		NA	
cis-1,3-Dichloropropene		1	U	NA		1	U	1	U	NA		NA	
Trichloroethene		14		NA		1			E		E		E
Dibromochloromethane		1	U	NA		1	U	1	U	NA		NA	
1,1,2-Trichloroethane		1	U	NA		1	U	1	U	NA		NA	
Benzene		1	U	NA		1	U	1	U	NA		NA	
Trans-1,3-Dichloropropene		1	U	NA		1	U	1	U	NA		NA	
Bromoform		1	U	NA		1	U	1	U	NA		NA	
4-Methyl-2-pentanone		2	U	NA		2	U	2	U	NA		NA	
2-Hexanone		2	U	NA		2	U	2	U	NA		NA	
Tetrachloroethene		1	U	NA		1	U	9		NA		NA	
1,1,2,2-Tetrachloroethane		1	U	NA		1	U	1	U	NA		NA	

* Outside of EPA CLP QC limits.

Cust ID: VBLK BS

RFW#: 92GVE092-MB1

Chlorobenzene	120	%
1,1,1,2-Tetrachloroethane	0.2	U
Ethylbenzene	0.1	U
Styrene	0.2	U
p-Xylene	0.2	U
m-Xylene	0.2	U
o-Xylene	0.3	U
Bromobenzene	0.1	U
1,2,3-Trichloropropane	0.4	U
Isopropylbenzene	0.2	U
n-Propylbenzene	0.2	U
2-Chlorotoluene	0.2	U
4-Chlorotoluene	0.2	U
1,3,5-Trimethylbenzene	0.1	U
tert-Butylbenzene	0.2	U
1,2,4-Trimethylbenzene	0.3	U
sec-Butylbenzene	0.2	U
p-Isopropyltoluene	0.2	U
1,3-Dichlorobenzene	0.1	U
1,4-Dichlorobenzene	0.3	U
1,2-Dichlorobenzene	0.1	U
n-Butylbenzene	0.1	U
1,2-Dibromo-3-Chloropropane	0.5	U
1,2,4-Trichlorobenzene	0.2	U
Hexachlorobutadiene	0.4	U
Naphthalene	0.2	U
1,2,3-Trichlorobenzene	0.1	U
cis-1,3-Dichloropropene	0.1	U
trans-1,3-Dichloropropene	0.3	U
Acetone	2	U
Carbon Disulfide	0.1	U
2-Butanone	0.3	U
Vinyl Acetate	0.3	U
4-Methyl-2-pentanone	0.4	U
2-Hexanone	0.5	U
2-Chloroethylvinylether	0.2	U

*= Outside of EPA CLP QC limits.

Roy F. Weston, Inc. - Gulf Coast Laboratories
VOLATILES BY GC/MS, METHOD 524 LIST

RFW Batch Number: 9203G478 Client: Ekco Houseware Work Order: 2994-02-03-0000 Report Date: 04/15/92 11:21 Page: 8a

133

Cust ID: VBLK BS

Sample Information
RFW#: 92GVE092-MB1
Matrix: WATER
D.F.: 1.00
Units: UG/L

Bromofluorobenzene	116	%
Dichlorodifluoromethane	0.3	U
Chloromethane	0.2	U
Bromomethane	0.1	U
Vinyl Chloride	0.2	U
Chloroethane	0.1	U
Methylene Chloride	0.6	U
Trichlorofluoromethane	0.1	U
1,1-Dichloroethene	162 *	%
1,1-Dichloroethane	0.1	U
cis-1,2-Dichloroethene	0.2	U
2,2-Dichloropropane	0.1	U
trans-1,2-Dichloroethene	0.1	U
Chloroform	0.2	U
Bromochloromethane	0.2	U
1,2-Dichloroethane	0.2	U
1,1,1-Trichloroethane	0.2	U
Carbon Tetrachloride	0.1	U
1,1-Dichloropropene	0.1	U
Bromodichloromethane	0.2	U
Dibromomethane	0.2	U
1,2-Dichloropropane	0.2	U
Trichloroethene	200 *	%
Dibromochloromethane	0.2	U
1,2-Dibromoethane	0.2	U
1,1,2-Trichloroethane	0.3	U
Benzene	118	%
1,3-Dichloropropane	0.2	U
Bromoform	0.2	U
Tetrachloroethene	0.1	U
1,1,2,2-Tetrachloroethane	0.2	U
Toluene	111	%

*= Outside of EPA CLP QC limits.

Roy F. Weston, Inc. - Gulf Coast Laboratories
VOLATILES BY GC/MS, HSL LIST

RFW Batch Number: 9202G419 Client: Ekco Houseware Work Order: 2994-02-02-0000 Report Date: 02/25/92 14:49 Page: 1a

	Cust ID:	Trip Blank	Trip Blank	FB-L-3	FB-L-3	L-1	L-1
Sample Information	RFW#:	001	002	003	003 DL	004	004 DL
	Matrix:	WATER	WATER	WATER	WATER	WATER	WATER
	D.F.:	1.00	1.00	1.00	4.00	1.00	5.00
	Units:	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
Surrogate Recovery	Toluene-d8	100 %	103 %	105 %	102 %	103 %	104 %
	Bromofluorobenzene	97 %	101 %	105 %	107 %	104 %	109 %
	1,2-Dichloroethane-d4	99 %	101 %	106 %	105 %	104 %	112 %
Chloromethane		2 U	2 U	2 U	NA	2 U	NA
Bromomethane		2 U	2 U	2 U	NA	2 U	NA
Vinyl Chloride		1 U	1 U	1 U	NA	E	*21
Chloroethane		2 U	2 U	2 U	NA	2 U	NA
Methylene Chloride		1	0.9 J	5	NA	1 U	NA
Acetone		6	2 U	2 U	NA	2 U	NA
Carbon Disulfide		1 U	1 U	1 U	NA	1 U	NA
1,1-Dichloroethene		1 U	1 U	1 U	NA	*2	NA
1,1-Dichloroethane		1 U	1 U	1 U	NA	E	*59
1,2-Dichloroethene (total)		1 U	1 U	1 U	NA	E	*90
Chloroform		1 U	1 U	2	NA	1 U	NA
1,2-Dichloroethane		1 U	1 U	1 U	NA	1 U	NA
2-Butanone		2 U	2 U	2 U	NA	2 U	NA
1,1,1-Trichloroethane		1 U	1 U	1 U	NA	*2	NA
Carbon Tetrachloride		1 U	1 U	1 U	NA	1 U	NA
Vinyl Acetate		2 U	2 U	2 U	NA	2 U	NA
Bromodichloromethane		1 U	1 U	1 U	NA	1 U	NA
1,2-Dichloropropane		1 U	1 U	1 U	NA	1 U	NA
cis-1,3-Dichloropropene		1 U	1 U	1 U	NA	1 U	NA
Trichloroethene		1 U	1 U	E	26	E	E
Dibromochloromethane		1 U	1 U	1 U	NA	1 U	NA
1,1,2-Trichloroethane		1 U	1 U	1 U	NA	1 U	NA
Benzene		1 U	1 U	1 U	NA	1 U	NA
Trans-1,3-Dichloropropene		1 U	1 U	1 U	NA	1 U	NA
Bromoform		1 U	1 U	1 U	NA	1 U	NA
4-Methyl-2-pentanone		2 U	2 U	2 U	NA	2 U	NA
2-Hexanone		2 U	2 U	2 U	NA	2 U	NA
Tetrachloroethene		1 U	1 U	1 U	NA	1 U	NA
1,1,2,2-Tetrachloroethane		1 U	1 U	1 U	NA	1 U	NA

*= Outside of EPA CLP QC limits.

[redacted] Batch Number: 92[redacted]9 [redacted] Work Order: [redacted]994[redacted]92-[redacted] [redacted] Page: [redacted]1

Cust ID:	Trip Blank	Trip Blank	FB-L-3	FB-L-3	L-1	L-1
RFW#:	001	002	003	003 DL	004	004 DL
Toluene	1 U	1 U	0.9 J	NA	1 U	NA
Chlorobenzene	1 U	1 U	1 U	NA	1 U	NA
Ethylbenzene	1 U	1 U	1 U	NA	1 U	NA
Styrene	1 U	1 U	1 U	NA	1 U	NA
Xylene (total)	1 U	1 U	1 U	NA	1 U	NA

*= Outside of EPA CLP QC limits.

Cust ID:	VBLK BS	VBLK	VBLK BS	VBLK	VBLK BS
RFW#:	91GVC313-MB1	91GVB342-MB1	91GVB342-MB1	91GVB343-MB1	91GVB343-MB1
Toluene	105 %	5 U	92 %	5 U	98 %
Chlorobenzene	108 %	5 U	94 %	5 U	94 %
Ethylbenzene	5 U	5 U	5 U	5 U	5 U
Styrene	5 U	5 U	5 U	5 U	5 U
Xylene (total)	5 U	5 U	5 U	5 U	5 U
2-Chloroethylvinylether	10 U	10 U	10 U	10 U	10 U

*= Outside of EPA CLP QC limits.

Roy F. Weston, Inc. - Gulf Coast Laboratories
VOLATILES BY GC/MS, HSL LIST

RFW Batch Number: 9109G724 | Client: Ekco Houseware | Work Order: 2994-02-03-0000 | Report Date: 10/10/91 13:07 | Page: 5a

	Cust ID:	VBLK BS	VBLK	VBLK BS	VBLK	VBLK BS
Sample Information	RFW#:	91GVC313-MB1	91GVB342-MB1	91GVB342-MB1	91GVB343-MB1	91GVB343-MB1
	Matrix:	SOIL	WATER	WATER	WATER	WATER
	D.F.:	1.00	1.00	1.00	1.00	1.00
	Units:	ug/Kg	ug/L	ug/L	ug/L	ug/L
Surrogate Recovery	Toluene-d8	96 %	101 %	101 %	96 %	105 %
	Bromofluorobenzene	99 %	102 %	107 %	107 %	118 * %
	1,2-Dichloroethane-d4	105 %	93 %	104 %	101 %	112 %
Chloromethane		10 U	10 U	10 U	10 U	10 U
Bromomethane		10 U	10 U	10 U	10 U	10 U
Vinyl Chloride		10 U	10 U	10 U	10 U	10 U
Chloroethane		10 U	10 U	10 U	10 U	10 U
Methylene Chloride		25 B	5 U	5 U	5 U	15
Acetone		31	17	10 U	10 U	10 U
Carbon Disulfide		5 U	5 U	5 U	5 U	5 U
1,1-Dichloroethene		101 %	5 U	85 %	5 U	90 %
1,1-Dichloroethane		5 U	5 U	5 U	5 U	5 U
1,2-Dichloroethene (total)		5 U	5 U	5 U	5 U	5 U
Chloroform		5 U	5 U	5 U	5 U	5 U
1,2-Dichloroethane		5 U	5 U	5 U	5 U	5 U
2-Butanone		10 U	10 U	10 U	10 U	10 U
1,1,1-Trichloroethane		5 U	5 U	11	5 U	5 U
Carbon Tetrachloride		5 U	5 U	5 U	5 U	5 U
Vinyl Acetate		10 U	10 U	10 U	10 U	10 U
Bromodichloromethane		5 U	5 U	5 U	5 U	5 U
1,2-Dichloropropane		5 U	5 U	5 U	5 U	5 U
cis-1,3-Dichloropropene		5 U	5 U	5 U	5 U	5 U
Trichloroethene		111 %	5 U	246 * %	5 U	99 %
Dibromochloromethane		5 U	5 U	5 U	5 U	5 U
1,1,2-Trichloroethane		5 U	5 U	5 U	5 U	5 U
Benzene		118 %	5 U	96 %	5 U	103 %
Trans-1,3-Dichloropropene		5 U	5 U	5 U	5 U	5 U
Bromoform		5 U	5 U	5 U	5 U	5 U
4-Methyl-2-pentanone		10 U	10 U	10 U	10 U	10 U
2-Hexanone		10 U	10 U	10 U	10 U	10 U
Tetrachloroethene		5 U	5 U	5 U	5 U	5 U
1,1,2,2-Tetrachloroethane		5 U	5 U	5 U	5 U	5 U

*= Outside of EPA CLP QC limits.

Cust ID:	SB07-FB	VBLK	VBLK BS	VBLK	VBLK BS	VBLK
RFW#:	013	91GVB338-MB1	91GVB338-MB1	91GVB339-MB1	91GVB339-MB1	91GVC313-MB1
Toluene	5 U	5 U	82 %	5 U	85 %	5 U
Chlorobenzene	5 U	5 U	93 %	5 U	93 %	5 U
Ethylbenzene	5 U	5 U	5 U	5 U	5 U	5 U
Styrene	5 U	5 U	5 U	5 U	5 U	5 U
Xylene (total)	5 U	5 U	5 U	5 U	5 U	5 U
2-Chloroethylvinylether	10 U	10 U	10 U	10 U	10 U	10 U

*= Outside of EPA CLP QC limits.

NS

Roy F. Weston, Inc. - Gulf Coast Laboratories
VOLATILES BY GC/MS, HSL LIST

RFW Batch Number: 91096724 Client: Ekco Houseware Work Order: 2994-02-03-0000 Report Date: 10/10/91 13:07 Page: 4a

	Cust ID:	SB07-FB	VBLK	VBLK BS	VBLK	VBLK BS	VBLK
Sample Information	RFW#:	013	91GVB338-MB1	91GVB338-MB1	91GVB339-MB1	91GVB339-MB1	91GVC313-MB1
	Matrix:	WATER	WATER	WATER	WATER	WATER	SOIL
	D.F.:	1.00	1.00	1.00	1.00	1.00	1.00
	Units:	ug/L	ug/L	ug/L	ug/L	ug/L	ug/Kg
Surrogate Recovery	Toluene-d8	102 %	96 %	94 %	98 %	96 %	97 %
	Bromofluorobenzene	102 %	95 %	107 %	103 %	110 %	97 %
	1,2-Dichloroethane-d4	99 %	98 %	112 %	95 %	106 %	99 %
		fl	fl	fl	fl	fl	fl
Chloromethane		10 U	10 U	10 U	10 U	10 U	10 U
Bromomethane		10 U	10 U	10 U	10 U	10 U	10 U
Vinyl Chloride		10 U	10 U	10 U	10 U	10 U	10 U
Chloroethane		10 U	10 U	10 U	10 U	10 U	10 U
Methylene Chloride		5 U	5 U	37	7	5 U	10
Acetone		10 U	10 U	10 U	12	32 B	10 U
Carbon Disulfide		5 U	5 U	5 U	5 U	5 U	5 U
1,1-Dichloroethene		5 U	5 U	72 %	5 U	64 %	5 U
1,1-Dichloroethane		5 U	5 U	5 U	5 U	5 U	5 U
1,2-Dichloroethene (total)		5 U	5 U	5 U	5 U	5 U	5 U
Chloroform		5 U	5 U	5 U	5 U	5 U	5 U
1,2-Dichloroethane		5 U	5 U	5 U	5 U	5 U	5 U
2-Butanone		10 U	10 U	10 U	10 U	10 U	10 U
1,1,1-Trichloroethane		5 U	5 U	5 U	5 U	5 U	5 U
Carbon Tetrachloride		5 U	5 U	5 U	5 U	5 U	5 U
Vinyl Acetate		10 U	10 U	10 U	10 U	10 U	10 U
Bromodichloromethane		5 U	5 U	5 U	5 U	5 U	5 U
1,2-Dichloropropane		5 U	5 U	5 U	5 U	5 U	5 U
cis-1,3-Dichloropropene		5 U	5 U	5 U	5 U	5 U	5 U
Trichloroethene		5 U	5 U	88 %	5 U	81 %	5 U
Dibromochloromethane		5 U	5 U	5 U	5 U	5 U	5 U
1,1,2-Trichloroethane		5 U	5 U	5 U	5 U	5 U	5 U
Benzene		5 U	5 U	97 %	5 U	92 %	5 U
Trans-1,3-Dichloropropene		5 U	5 U	5 U	5 U	5 U	5 U
Bromoform		5 U	5 U	5 U	5 U	5 U	5 U
4-Methyl-2-pentanone		10 U	10 U	10 U	10 U	10 U	10 U
2-Hexanone		10 U	10 U	10 U	10 U	10 U	10 U
Tetrachloroethene		5 U	5 U	5 U	5 U	5 U	5 U
1,1,2,2-Tetrachloroethane		5 U	5 U	5 U	5 U	5 U	5 U

*= Outside of EPA CLP QC limits.

Cust ID:	SB07-04-06	SB07-00-02	R-2-GW	R-2-GW	I-5-GW	I-6-GW
RFW#:	008 MSD	009	010	010 DL	011	012
Toluene	94 %	6 U	5 U	NA	5 U	5 U
Chlorobenzene	88 %	6 U	5 U	NA	5 U	5 U
Ethylbenzene	6 U	6 U	5 U	NA	5 U	5 U
Styrene	6 U	6 U	5 U	NA	5 U	5 U
Xylene (total)	6 U	6 U	5 U	NA	5 U	5 U
2-Chloroethylvinylether	11 U	12 U	10 U	NA	10 U	10 U

*- Outside of EPA CLP QC limits.

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Roy F. Weston, Inc. - Gulf Coast Laboratories
VOLATILES BY GC/MS, HSL LIST
Report Date: 10/10/91 13:07

RFW Batch Number: 9109G724 Client: Ekco Houseware Work Order: 2994-02-03-0000 Page: 3a

	Cust ID:	SB07-04-06	SB07-00-02	R-2-GW	R-2-GW	I-5-GW	I-6-GW
Sample Information	RFW#:	008 MSD	009	010	010 DL	011	012
	Matrix:	SOIL	SOIL	WATER	WATER	WATER	WATER
	D.F.:	1.00	1.00	1.00	10.0	1.00	1.00
	Units:	ug/Kg	ug/Kg	ug/L	ug/L	ug/L	ug/L
Surrogate Recovery	Toluene-d8	107 %	107 %	100 %	105 %	101 %	101 %
	Bromofluorobenzene	88 %	85 %	99 %	109 %	101 %	104 %
	1,2-Dichloroethane-d4	98 %	101 %	94 %	113 %	94 %	97 %
Chloromethane		11 U	12 U	10 U	NA	10 U	10 U
Bromomethane		11 U	12 U	10 U	NA	10 U	10 U
Vinyl Chloride		11 U	12 U	130	NA	10 U	10 U
Chloroethane		11 U	12 U	10 U	NA	10 U	10 U
Methylene Chloride		33 B	47 B	5 U	NA	5 U	5 U
Acetone		100	37 J	46 B	NA	10 U	10 U
Carbon Disulfide		6 U	6 U	5 U	NA	5 U	5 U
1,1-Dichloroethene		70 %	6 U	51	NA	5 U	5 U
1,1-Dichloroethane		6 U	6 U	E 210	240	48 J	5 U
1,2-Dichloroethene (total)		43	210	E 180	180	5 U	5 U
Chloroform		6 U	6 U	5 U	NA	5 U	5 U
1,2-Dichloroethane		6 U	6 U	5 U	NA	5 U	5 U
2-Butanone		11 U	12 U	10 U	NA	10 U	10 U
1,1,1-Trichloroethane		6 U	6 U	16	NA	5 U	5 U
Carbon Tetrachloride		6 U	6 U	5 U	NA	5 U	5 U
Vinyl Acetate		11 U	12 U	10 U	NA	10 U	10 U
Bromodichloromethane		6 U	6 U	5 U	NA	5 U	5 U
1,2-Dichloropropane		6 U	6 U	5 U	NA	5 U	5 U
cis-1,3-Dichloropropene		6 U	6 U	5 U	NA	5 U	5 U
Trichloroethene		99 %	210	E 160	760	5 U	5 U
Dibromochloromethane		6 U	6 U	5 U	NA	5 U	5 U
1,1,2-Trichloroethane		6 U	6 U	5 U	NA	5 U	5 U
Benzene		96 %	6 U	5 U	NA	5 U	5 U
Trans-1,3-Dichloropropene		6 U	6 U	5 U	NA	5 U	5 U
Bromoform		6 U	6 U	5 U	NA	5 U	5 U
4-Methyl-2-pentanone		11 U	12 U	10 U	NA	10 U	10 U
2-Hexanone		11 U	12 U	10 U	NA	10 U	10 U
Tetrachloroethene		6 U	6 U	5 U	NA	5 U	5 U
1,1,2,2-Tetrachloroethane		6 U	6 U	5 U	NA	5 U	5 U

*= Outside of EPA CLP QC limits.

RFW Batch Number: 9109G724 Client: Ekco Houseware Work Order: 2994-02-03-0000 Page: 2b

Cust ID:	SB08-02-04	SB08-06-08	SB08-10-12	SB08-10-12 Dup	SB07-04-06	SB07-04-06
RFW#:	004	005	006	007	008	008 MS
Toluene	6 U	6 U	6 U	6 U	6 U	93 %
Chlorobenzene	6 U	6 U	6 U	6 U	6 U	86 %
Ethylbenzene	6 U	6 U	6 U	6 U	6 U	6 U
Styrene	6 U	6 U	6 U	6 U	6 U	6 U
Xylene (total)	6 U	6 U	6 U	6 U	6 U	6 U
2-Chloroethylvinylether	12 U	12 U	11 U	12 U	11 U	11 U

*= Outside of EPA CLP QC limits.

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Roy F. Weston, Inc. - Gulf Coast Laboratories
VOLATILES BY GC/MS, HSL LIST

RFW Batch Number: 91096724 Client: Ekco Houseware Work Order: 2994-02-03-0000 Report Date: 10/10/91 13:07 Page: 2a

	Cust ID:	SB08-02-04	SB08-06-08	SB08-10-12	SB08-10-12 Dup	SB07-04-06	SB07-04-06
Sample Information	RFW#:	004	005	006	007	008	008 MS
	Matrix:	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
	D.F.:	1.00	1.00	1.00	1.00	1.00	1.00
	Units:	ug/Kg	ug/Kg	ug/Kg	ug/Kg	ug/Kg	ug/Kg
Surrogate Recovery	Toluene-d8	97 %	104 %	101 %	99 %	103 %	109 %
	Bromofluorobenzene	91 %	90 %	91 %	91 %	90 %	85 %
	1,2-Dichloroethane-d4	100 %	100 %	104 %	103 %	101 %	98 %
Chloromethane		12 U	12 U	11 U	12 U	11 U	11 U
Bromomethane		12 U	12 U	11 U	12 U	11 U	11 U
Vinyl Chloride		12 U	12 U	11 U	12 U	11 U	11 U
Chloroethane		12 U	12 U	11 U	12 U	11 U	11 U
Methylene Chloride		18 B	21 B	20 B	14 B	30 B	36 B
Acetone		64	64	100	100	93	110
Carbon Disulfide		6 U	6 U	6 U	6 U	6 U	6 U
1,1-Dichloroethene		6 U	6 U	6 U	6 U	6 U	71 %
1,1-Dichloroethane		6 U	6 U	6 U	6 U	6 U	6 U
1,2-Dichloroethene (total)		6 U	6 U	6 U	6 U	31	53
Chloroform		6 U	6 U	6 U	6 U	6 U	6 U
1,2-Dichloroethane		6 U	6 U	6 U	6 U	6 U	6 U
2-Butanone		12 U	12 U	11 U	12 U	11 U	11 U
1,1,1-Trichloroethane		6 U	6 U	6 U	6 U	6 U	6 U
Carbon Tetrachloride		6 U	6 U	6 U	6 U	6 U	6 U
Vinyl Acetate		12 U	12 U	11 U	12 U	11 U	11 U
Bromodichloromethane		6 U	6 U	6 U	6 U	6 U	6 U
1,2-Dichloropropane		6 U	6 U	6 U	6 U	6 U	6 U
cis-1,3-Dichloropropene		6 U	6 U	6 U	6 U	6 U	6 U
Trichloroethene		6 U	6 U	6 U	6 U	140	121 %
Dibromochloromethane		6 U	6 U	6 U	6 U	6 U	6 U
1,1,2-Trichloroethane		6 U	6 U	6 U	6 U	6 U	6 U
Benzene		6 U	6 U	6 U	6 U	6 U	95 %
Trans-1,3-Dichloropropene		6 U	6 U	6 U	6 U	6 U	6 U
Bromoform		6 U	6 U	6 U	6 U	6 U	6 U
4-Methyl-2-pentanone		12 U	12 U	11 U	12 U	11 U	11 U
2-Hexanone		12 U	12 U	11 U	12 U	11 U	11 U
Tetrachloroethene		6 U	6 U	6 U	6 U	6 U	6 U
1,1,2,2-Tetrachloroethane		6 U	6 U	6 U	6 U	6 U	6 U

*= Outside of EPA CLP QC limits.

Cust ID:	Trip Blank GW	R-1-GW	R-1-GW	R-3-GW	R-3-GW	R-3-GW
RFW#:	001	002	002 DL	003	003 MS	003 MSD
Toluene	5 U	5 U	NA	5 U	87 %	86 %
Chlorobenzene	5 U	5 U	NA	5 U	91 %	90 %
Ethylbenzene	5 U	5 U	NA	5 U	5 U	5 U
Styrene	5 U	5 U	NA	5 U	5 U	5 U
Xylene (total)	5 U	5 U	NA	5 U	5 U	5 U
2-Chloroethylvinylether	10 U	10 U	NA	10 U	10 U	10 U

*= Outside of EPA CLP QC limits.

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T-2, T-4, R-1, R-2, R-3, SP-2, SW-1, SB-3

Roy F. Weston, Inc. - Gulf Coast Laboratories
VOLATILES BY GC/MS, HSL LIST
Report Date: 10/10/91 13:07

RFW Batch Number: 9109G724 Client: Ekco Houseware Work Order: 2994-02-03-0000 Page: 1a

Sample Information	Cust ID:	Trip Blank GW		R-1-GW		R-1-GW		R-3-GW		R-3-GW		R-3-GW	
	RFW#:	001		002		002 DL		003		003 MS		003 MSD	
	Matrix:	WATER		WATER		WATER		WATER		WATER		WATER	
	D.F.:	1.00		1.00		2.00		1.00		1.00		1.00	
	Units:	ug/L		ug/L		ug/L		ug/L		ug/L		ug/L	
Surrogate Recovery	Toluene-d8	95	%	99	%	102	%	98	%	98	%	100	%
	Bromofluorobenzene	102	%	100	%	105	%	103	%	100	%	102	%
	1,2-Dichloroethane-d4	104	%	107	%	94	%	104	%	105	%	105	%
Chloromethane		10	U	10	U	NA		10	U	10	U	10	U
Bromomethane		10	U	10	U	NA		10	U	10	U	10	U
Vinyl Chloride		10	U	25		NA		10	U	10	U	10	U
Chloroethane		10	U	10	U	NA		10	U	10	U	10	U
Methylene Chloride		16		5	U	NA		5	U	26		25	
Acetone		10	U	10	U	NA		10	U	10	U	10	U
Carbon Disulfide		5	U	5	U	NA		5	U	5	U	5	U
1,1-Dichloroethene		5	U	5	U	NA		5	U	87	%	85	%
1,1-Dichloroethane		5	U	17		NA		51		48		47	
1,2-Dichloroethene (total)		5	U	83		NA		5	U	5	U	5	U
Chloroform		5	U	5	U	NA		5	U	5	U	5	U
1,2-Dichloroethane		5	U	5	U	NA		5	U	5	U	5	U
2-Butanone		10	U	10	U	NA		10	U	10	U	10	U
1,1,1-Trichloroethane		5	U	54		NA		49		46		53	
Carbon Tetrachloride		5	U	5	U	NA		5	U	5	U	5	U
Vinyl Acetate		10	U	10	U	NA		10	U	10	U	10	U
Bromodichloromethane		5	U	5	U	NA		5	U	5	U	5	U
1,2-Dichloropropane		5	U	5	U	NA		5	U	5	U	5	U
cis-1,3-Dichloropropene		5	U	5	U	NA		5	U	5	U	5	U
Trichloroethene		5	U		E	390	390	8		86	%	91	%
Dibromochloromethane		5	U	5	U	NA		5	U	5	U	5	U
1,1,2-Trichloroethane		5	U	5	U	NA		5	U	5	U	5	U
Benzene		5	U	5	U	NA		5	U	97	%	95	%
Trans-1,3-Dichloropropene		5	U	5	U	NA		5	U	5	U	5	U
Bromoform		5	U	5	U	NA		5	U	5	U	5	U
4-Methyl-2-pentanone		10	U	10	U	NA		10	U	10	U	10	U
2-Hexanone		10	U	10	U	NA		10	U	10	U	10	U
Tetrachloroethene		5	U	5	U	NA		5	U	5	U	5	U
1,1,2,2-Tetrachloroethane		5	U	5	U	NA		5	U	5	U	5	U

*- Outside of EPA CLP QC limits.

	Cust ID:	VBLK	VBLK BS
	RFW#:	91GVE245-MB1	91GVE245-MB1
Toluene		5 U	86 %
Chlorobenzene		5 U	90 %
Ethylbenzene		5 U	5 U
Styrene		5 U	5 U
Xylene (total)		5 U	5 U
2-Chloroethylvinylether		10 U	10 U

*= Outside of EPA CLP QC limits.

Roy F. Weston, Inc. - Gulf Coast Laboratories
VOLATILES BY GC/MS, HSL LIST

RFW Batch Number: 9109G745 Client: Ekco Houseware Report Date: 10/15/91 14:05
Work Order: 2994-02-03-0000 Page: 4a

	Cust ID:	VBLK	VBLK BS
Sample Information	RFW#:	91GVE245-MB1	91GVE245-MB1
	Matrix:	WATER	WATER
	D.F.:	1.00	1.00
	Units:	ug/L	ug/L
Surrogate Recovery	Toluene-d8	101 %	102 %
	Bromofluorobenzene	102 %	104 %
	1,2-Dichloroethane-d4	98 %	101 %
Chloromethane		10 U	10 U
Bromomethane		10 U	10 U
Vinyl Chloride		10 U	10 U
Chloroethane		10 U	10 U
Methylene Chloride		5 U	5
Acetone		10 U	10 U
Carbon Disulfide		5 U	5 U
1,1-Dichloroethene		5 U	60 * %
1,1-Dichloroethane		5 U	5 U
1,2-Dichloroethene (total)		5 U	5 U
Chloroform		5 U	5 U
1,2-Dichloroethane		5 U	5 U
2-Butanone		10 U	10 U
1,1,1-Trichloroethane		5 U	5 U
Carbon Tetrachloride		5 U	5 U
Vinyl Acetate		10 U	10 U
Bromodichloromethane		5 U	5 U
1,2-Dichloropropane		5 U	5 U
cis-1,3-Dichloropropene		5 U	5 U
Trichloroethene		5 U	67 * %
Dibromochloromethane		5 U	5 U
1,1,2-Trichloroethane		5 U	5 U
Benzene		5 U	65 * %
Trans-1,3-Dichloropropene		5 U	5 U
Bromoform		5 U	5 U
4-Methyl-2-pentanone		10 U	10 U
2-Hexanone		10 U	10 U
Tetrachloroethene		5 U	5 U
1,1,2,2-Tetrachloroethane		5 U	5 U

*= Outside of EPA CLP QC limits.

RFW Batch Number: 9203G478 Client: Ekco Houseware Work Order: 2994-02-03-0000 Page: 7b

	Cust ID:	VBLK BS	VBLK	VBLK BS	VBLK	VBLK BS	VBLK
	RFW#:	92GVE082-MB1	92GVE095-MB1	92GVE095-MB1	92GVE083-MB1	92GVE083-MB1	92GVE092-MB1
Chlorobenzene		74 * %	0.1 U	85 %	0.1 U	205 * %	0.1 U
1,1,1,2-Tetrachloroethane		0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
Ethylbenzene		0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
Styrene		0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
p-Xylene		0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
m-Xylene		0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
o-Xylene		0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
Bromobenzene		0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
1,2,3-Trichloropropane		0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U
Isopropylbenzene		0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
n-Propylbenzene		0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
2-Chlorotoluene		0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
4-Chlorotoluene		0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
1,3,5-Trimethylbenzene		0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
tert-Butylbenzene		0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
1,2,4-Trimethylbenzene		0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
sec-Butylbenzene		0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
p-Isopropyltoluene		0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
1,3-Dichlorobenzene		0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
1,4-Dichlorobenzene		0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
1,2-Dichlorobenzene		0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
n-Butylbenzene		0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
1,2-Dibromo-3-Chloropropane		0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,2,4-Trichlorobenzene		0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
Hexachlorobutadiene		0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U
Naphthalene		0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
1,2,3-Trichlorobenzene		0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
cis-1,3-Dichloropropene		0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
trans-1,3-Dichloropropene		0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
Acetone		2 U	2 U	2 U	2 U	2 U	2 U
Carbon Disulfide		0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
2-Butanone		0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
Vinyl Acetate		0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
4-Methyl-2-pentanone		0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U
2-Hexanone		0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
2-Chloroethylvinylether		0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U

*= Outside of EPA CLP QC limits.

Roy F. Weston, Inc. - Gulf Coast Laboratories
VOLATILES BY GC/MS, METHOD 524 LIST

RFW Batch Number: 9203G478 Client: Ekco Houseware Work Order: 2994-02-03-0000 Report Date: 04/15/92 11:21 Page: 7a

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Sample Information	Cust ID:	VBLK BS	VBLK	VBLK BS	VBLK	VBLK BS	VBLK
	RFW#:	92GVE082-MB1	92GVE095-MB1	92GVE095-MB1	92GVE083-MB1	92GVE083-MB1	92GVE092-MB1
	Matrix:	WATER	WATER	WATER	WATER	WATER	WATER
	D.F.:	1.00	1.00	1.00	1.00	1.00	1.00
	Units:	UG/L	UG/L	UG/L	UG/L	UG/L	UG/L

Bromofluorobenzene	110 %	111 %	111 %	100 %	93 %	111 %
Dichlorodifluoromethane	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
Chloromethane	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
Bromomethane	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
Vinyl Chloride	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
Chloroethane	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
Methylene Chloride	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U
Trichlorofluoromethane	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
1,1-Dichloroethene	92 %	0.1 U	113 %	0.1 U	259 * %	0.1 U
1,1-Dichloroethane	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
cis-1,2-Dichloroethene	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
2,2-Dichloropropane	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
trans-1,2-Dichloroethene	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
Chloroform	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
Bromochloromethane	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
1,2-Dichloroethane	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
1,1,1-Trichloroethane	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
Carbon Tetrachloride	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
1,1-Dichloropropene	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
Bromodichloromethane	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
Dibromomethane	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
1,2-Dichloropropane	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
Trichloroethene	120 %	0.3 U	136 * %	0.3 U	266 * %	0.3 U
Dibromochloromethane	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
1,2-Dibromoethane	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
1,1,2-Trichloroethane	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
Benzene	111 %	0.2 U	81 %	0.2 U	172 * %	0.2 U
1,3-Dichloropropane	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
Bromoform	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
Tetrachloroethene	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
1,1,2,2-Tetrachloroethane	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
Toluene	69 * %	0.1 U	76 %	0.1 U	171 * %	0.1 U

*= Outside of EPA CLP QC limits.

RFW Batch Number: 9203G478 Client: Ekco Houseware Work Order: 2994-02-03-0000 Page: 6b

Cust ID:	S-12-GW	S-12-GW	S-12-GW	VBLK	VBLK BS	VBLK
RFW#:	020 DL	020 MS	020 MSD	92GVE081-MB1	92GVE081-MB1	92GVE082-MB1
Chlorobenzene	NA	198 * %	219 * %	0.1 U	156 * %	0.1 U
1,1,1,2-Tetrachloroethane	NA	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
Ethylbenzene	NA	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
Styrene	NA	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
p-Xylene	NA	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
m-Xylene	NA	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
o-Xylene	NA	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
Bromobenzene	NA	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
1,2,3-Trichloropropane	NA	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U
Isopropylbenzene	NA	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
n-Propylbenzene	NA	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
2-Chlorotoluene	NA	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
4-Chlorotoluene	NA	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
1,3,5-Trimethylbenzene	NA	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
tert-Butylbenzene	NA	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
1,2,4-Trimethylbenzene	NA	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
sec-Butylbenzene	NA	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
p-Isopropyltoluene	NA	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
1,3-Dichlorobenzene	NA	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
1,4-Dichlorobenzene	NA	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
1,2-Dichlorobenzene	NA	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
n-Butylbenzene	NA	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
1,2-Dibromo-3-Chloropropane	NA	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,2,4-Trichlorobenzene	NA	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
Hexachlorobutadiene	NA	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U
Naphthalene	NA	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
1,2,3-Trichlorobenzene	NA	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
cis-1,3-Dichloropropene	NA	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
trans-1,3-Dichloropropene	NA	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
Acetone	NA	2 U	2 U	2 U	2 U	2 U
Carbon Disulfide	NA	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
2-Butanone	NA	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
Vinyl Acetate	NA	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
4-Methyl-2-pentanone	NA	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U
2-Hexanone	NA	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
2-Chloroethylvinylether	NA	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U

*= Outside of EPA CLP QC limits.

Roy F. Weston, Inc. - Gulf Coast Laboratories
VOLATILES BY GC/MS, METHOD 524 LIST

RFW Batch Number: 9203G478 Client: Ekco Houseware Work Order: 2994-02-03-0000 Report Date: 04/15/92 11:21 Page: 6a

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	Cust ID:	S-12-GW	S-12-GW	S-12-GW	VBLK	VBLK BS	VBLK
Sample Information	RFW#:	020 DL	020 MS	020 MSD	92GVE081-MB1	92GVE081-MB1	92GVE082-MB1
	Matrix:	WATER	WATER	WATER	WATER	WATER	WATER
	D.F.:	100	1.00	1.00	1.00	1.00	1.00
	Units:	UG/L	UG/L	UG/L	UG/L	UG/L	UG/L

Bromofluorobenzene	112 %	93 %	95 %	105 %	100 %	106 %
	fl	fl	fl	fl	fl	fl
Dichlorodifluoromethane	NA	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
Chloromethane	NA	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
Bromomethane	NA	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
Vinyl Chloride	NA	5	0.2 U	0.2 U	0.2 U	0.2 U
Chloroethane	NA	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
Methylene Chloride	NA	8	8	0.6 U	0.6 U	0.6 U
Trichlorofluoromethane	NA	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
1,1-Dichloroethene	NA	279 * %	268 * %	0.1 U	201 * %	0.1 U
1,1-Dichloroethane	NA	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
cis-1,2-Dichloroethene	NA	E	70	0.2 U	0.2 U	0.2 U
2,2-Dichloropropane	NA	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
trans-1,2-Dichloroethene	NA	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
Chloroform	NA	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
Bromochloromethane	NA	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
1,2-Dichloroethane	NA	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
1,1,1-Trichloroethane	NA	5	4	0.2 U	0.2 U	0.2 U
Carbon Tetrachloride	NA	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
1,1-Dichloropropene	NA	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
Bromodichloromethane	NA	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
Dibromomethane	NA	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
1,2-Dichloropropane	NA	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
Trichloroethene	2300	732 * %	0 * %	0.3 U	219 * %	0.3 U
Dibromochloromethane	NA	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
1,2-Dibromoethane	NA	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
1,1,2-Trichloroethane	NA	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
Benzene	NA	177 * %	174 * %	0.2 U	157 * %	0.2 U
1,3-Dichloropropane	NA	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
Bromoform	NA	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
Tetrachloroethene	NA	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
1,1,2,2-Tetrachloroethane	NA	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
Toluene	NA	170 * %	179 * %	0.1 U	132 * %	0.1 U

*= Outside of EPA CLP QC limits.

RFW Batch Number: 9203G478 Client: Ekco Houseware Work Order: 2994-02-03-0000 Page: 5b

Cust ID:	R-12-GW	R-12-GW	S-4-GW	S-11-GW	S-12-GW	S-12-GW
RFW#:	017	017 DL	018	019	020	020 DL
Chlorobenzene	0.1 U	NA	0.1 U	0.1 U	0.1 U	NA
1,1,1,2-Tetrachloroethane	0.2 U	NA	0.2 U	0.2 U	0.2 U	NA
Ethylbenzene	0.1 U	NA	0.1 U	0.1 U	0.1 U	NA
Styrene	0.2 U	NA	0.2 U	0.2 U	0.2 U	NA
p-Xylene	0.2 U	NA	0.2 U	0.2 U	0.2 U	NA
m-Xylene	0.2 U	NA	0.2 U	0.2 U	0.2 U	NA
o-Xylene	0.3 U	NA	0.3 U	0.3 U	0.3 U	NA
Bromobenzene	0.1 U	NA	0.1 U	0.1 U	0.1 U	NA
1,2,3-Trichloropropane	0.4 U	NA	0.4 U	0.4 U	0.4 U	NA
Isopropylbenzene	0.2 U	NA	0.2 U	0.2 U	0.2 U	NA
n-Propylbenzene	0.2 U	NA	0.2 U	0.2 U	0.2 U	NA
2-Chlorotoluene	0.2 U	NA	0.2 U	0.2 U	0.2 U	NA
4-Chlorotoluene	0.2 U	NA	0.2 U	0.2 U	0.2 U	NA
1,3,5-Trimethylbenzene	0.1 U	NA	0.1 U	0.1 U	0.1 U	NA
tert-Butylbenzene	0.2 U	NA	0.2 U	0.2 U	0.2 U	NA
1,2,4-Trimethylbenzene	0.3 U	NA	0.3 U	0.3 U	0.3 U	NA
sec-Butylbenzene	0.2 U	NA	0.2 U	0.2 U	0.2 U	NA
p-Isopropyltoluene	0.2 U	NA	0.2 U	0.2 U	0.2 U	NA
1,3-Dichlorobenzene	0.1 U	NA	0.1 U	0.1 U	0.1 U	NA
1,4-Dichlorobenzene	0.3 U	NA	0.3 U	0.3 U	0.3 U	NA
1,2-Dichlorobenzene	0.1 U	NA	0.1 U	0.1 U	0.1 U	NA
n-Butylbenzene	0.1 U	NA	0.1 U	0.1 U	0.1 U	NA
1,2-Dibromo-3-Chloropropane	0.5 U	NA	0.5 U	0.5 U	0.5 U	NA
1,2,4-Trichlorobenzene	0.2 U	NA	0.2 U	0.2 U	0.2 U	NA
Hexachlorobutadiene	0.4 U	NA	0.4 U	0.4 U	0.4 U	NA
Naphthalene	0.2 U	NA	0.2 U	0.2 U	0.2 U	NA
1,2,3-Trichlorobenzene	0.1 U	NA	0.1 U	0.1 U	0.1 U	NA
cis-1,3-Dichloropropene	0.1 U	NA	0.1 U	0.1 U	0.1 U	NA
trans-1,3-Dichloropropene	0.3 U	NA	0.3 U	0.3 U	0.3 U	NA
Acetone	2 U	NA	2 U	2 U	2 U	NA
Carbon Disulfide	0.1 U	NA	0.1 U	0.1 U	0.1 U	NA
2-Butanone	0.3 U	NA	0.3 U	0.3 U	0.3 U	NA
Vinyl Acetate	0.3 U	NA	0.3 U	0.3 U	0.3 U	NA
4-Methyl-2-pentanone	0.4 U	NA	0.4 U	0.4 U	0.4 U	NA
2-Hexanone	0.5 U	NA	0.5 U	0.5 U	0.5 U	NA
2-Chloroethylvinylether	0.2 U	NA	0.2 U	0.2 U	0.2 U	NA

*= Outside of EPA CLP QC limits.

Roy F. Weston, Inc. - Gulf Coast Laboratories
VOLATILES BY GC/MS, METHOD 524 LIST

RFW Batch Number: 9203G478 | Client: Ekco Houseware | Work Order: 2994-02-03-0000 | Report Date: 04/15/92 11:21 | Page: 5a

Sample Information	Cust ID:	R-12-GW	R-12-GW	S-4-GW	S-11-GW	S-12-GW	S-12-GW
	RFW#:	017	017 DL	018	019	020	020 DL
	Matrix:	WATER	WATER	WATER	WATER	WATER	WATER
	D.F.:	1.00	2.00	1.00	1.00	1.00	10.0
	Units:	UG/L	UG/L	UG/L	UG/L	UG/L	UG/L
Bromofluorobenzene		94 %	106 %	96 %	96 %	92 %	115 %
		fl	fl	fl	fl	fl	fl
Dichlorodifluoromethane		0.3 U	NA	0.3 U	0.3 U	0.3 U	NA
Chloromethane		0.2 U	NA	0.2 U	0.2 U	0.2 U	NA
Bromomethane		0.1 U	NA	0.1 U	0.1 U	0.1 U	NA
Vinyl Chloride		0.2 U	NA	0.2 U	0.2 U	5	NA
Chloroethane		0.1 U	NA	0.1 U	0.1 U	0.1 U	NA
Methylene Chloride		9	NA	[illegible] U	8	9	NA
Trichlorofluoromethane		2	NA	0.1 U	2	2	NA
1,1-Dichloroethene		3	NA	0.1 U	0.1 U	0.1 U	NA
1,1-Dichloroethane		E	22	0.1 U	0.1 U	0.1 U	NA
cis-1,2-Dichloroethene		16	NA	0.2 U	0.2 U	E	36
2,2-Dichloropropane		0.1 U	NA	0.1 U	0.1 U	0.1 U	NA
trans-1,2-Dichloroethene		0.1 U	NA	0.1 U	0.1 U	0.1 U	NA
Chloroform		0.2 U	NA	0.2 U	0.2 U	0.2 U	NA
Bromochloromethane		0.2 U	NA	0.2 U	0.2 U	0.2 U	NA
1,2-Dichloroethane		0.2 U	NA	0.2 U	0.2 U	0.2 U	NA
1,1,1-Trichloroethane		0.2 U	NA	0.2 U	0.2 U	5	NA
Carbon Tetrachloride		0.1 U	NA	0.1 U	0.1 U	0.1 U	NA
1,1-Dichloropropene		0.1 U	NA	0.1 U	0.1 U	0.1 U	NA
Bromodichloromethane		0.2 U	NA	0.2 U	0.2 U	0.2 U	NA
Dibromomethane		0.2 U	NA	0.2 U	0.2 U	0.2 U	NA
1,2-Dichloropropane		0.2 U	NA	0.2 U	0.2 U	0.2 U	NA
Trichloroethene		17	NA	5	0.3 U	E	E
Dibromochloromethane		0.2 U	NA	0.2 U	0.2 U	0.2 U	NA
1,2-Dibromoethane		0.2 U	NA	0.2 U	0.2 U	0.2 U	NA
1,1,2-Trichloroethane		0.3 U	NA	0.3 U	0.3 U	0.3 U	NA
Benzene		0.2 U	NA	0.2 U	0.2 U	0.2 U	NA
1,3-Dichloropropane		0.2 U	NA	0.2 U	0.2 U	0.2 U	NA
Bromoform		0.2 U	NA	0.2 U	0.2 U	0.2 U	NA
Tetrachloroethene		0.1 U	NA	0.1 U	0.1 U	0.1 U	NA
1,1,2,2-Tetrachloroethane		0.2 U	NA	0.2 U	0.2 U	0.2 U	NA
Toluene		0.1 U	NA	0.1 U	0.1 U	0.1 U	NA

*= Outside of EPA CLP QC limits.

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RFW Batch Number: 9203G478 Client: Ekco Houseware Work Order: 2994-02-03-0000 Page: 4b

Cust ID:	I-4-GW		I-4-GW		R-7-GW		R-7-GW		R-10-GW		R-10-GW	
RFW#:	014		014 DL		015		015 DL		016		016 DL	
Chlorobenzene	0.1	U	NA		0.1	U	NA		0.1	U	NA	
1,1,1,2-Tetrachloroethane	0.2	U	NA		0.2	U	NA		0.2	U	NA	
Ethylbenzene	0.1	U	NA		0.1	U	NA		0.1	U	NA	
Styrene	0.2	U	NA		0.2	U	NA		0.2	U	NA	
p-Xylene	0.2	U	NA		0.2	U	NA		0.2	U	NA	
m-Xylene	0.2	U	NA		0.2	U	NA		0.2	U	NA	
o-Xylene	0.3	U	NA		0.3	U	NA		0.3	U	NA	
Bromobenzene	0.1	U	NA		0.1	U	NA		0.1	U	NA	
1,2,3-Trichloropropane	0.4	U	NA		0.4	U	NA		0.4	U	NA	
Isopropylbenzene	0.2	U	NA		0.2	U	NA		0.2	U	NA	
n-Propylbenzene	0.2	U	NA		0.2	U	NA		0.2	U	NA	
2-Chlorotoluene	0.2	U	NA		0.2	U	NA		0.2	U	NA	
4-Chlorotoluene	0.2	U	NA		0.2	U	NA		0.2	U	NA	
1,3,5-Trimethylbenzene	0.1	U	NA		0.1	U	NA		0.1	U	NA	
tert-Butylbenzene	0.2	U	NA		0.2	U	NA		0.2	U	NA	
1,2,4-Trimethylbenzene	0.3	U	NA		0.3	U	NA		0.3	U	NA	
sec-Butylbenzene	0.2	U	NA		0.2	U	NA		0.2	U	NA	
p-Isopropyltoluene	0.2	U	NA		0.2	U	NA		0.2	U	NA	
1,3-Dichlorobenzene	0.1	U	NA		0.1	U	NA		0.1	U	NA	
1,4-Dichlorobenzene	0.3	U	NA		0.3	U	NA		0.3	U	NA	
1,2-Dichlorobenzene	0.1	U	NA		0.1	U	NA		0.1	U	NA	
n-Butylbenzene	0.1	U	NA		0.1	U	NA		0.1	U	NA	
1,2-Dibromo-3-Chloropropane	0.5	U	NA		0.5	U	NA		0.5	U	NA	
1,2,4-Trichlorobenzene	0.2	U	NA		0.2	U	NA		0.2	U	NA	
Hexachlorobutadiene	0.4	U	NA		0.4	U	NA		0.4	U	NA	
Naphthalene	0.2	U	NA		0.2	U	NA		0.2	U	NA	
1,2,3-Trichlorobenzene	0.1	U	NA		0.1	U	NA		0.1	U	NA	
cis-1,3-Dichloropropene	0.1	U	NA		0.1	U	NA		0.1	U	NA	
trans-1,3-Dichloropropene	0.3	U	NA		0.3	U	NA		0.3	U	NA	
Acetone	2	U	NA		2	U	NA		2	U	NA	
Carbon Disulfide	0.1	U	NA		0.1	U	NA		0.1	U	NA	
2-Butanone	0.3	U	NA		0.3	U	NA		0.3	U	NA	
Vinyl Acetate	0.3	U	NA		0.3	U	NA		0.3	U	NA	
4-Methyl-2-pentanone	0.4	U	NA		0.4	U	NA		0.4	U	NA	
2-Hexanone	0.5	U	NA		0.5	U	NA		0.5	U	NA	
2-Chloroethylvinylether	0.2	U	NA		0.2	U	NA		0.2	U	NA	

*= Outside of EPA CLP QC limits.

Roy F. Weston, Inc. - Gulf Coast Laboratories
VOLATILES BY GC/MS, METHOD 524 LIST

RFW Batch Number: 9203G478 Client: Ekco Houseware Work Order: 2994-02-03-0000 Report Date: 04/15/92 11:21 Page: 4a

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Sample Information	Cust ID:	I-4-GW	I-4-GW	R-7-GW	R-7-GW	R-10-GW	R-10-GW
	RFW#:	014	014 DL	015	015 DL	016	016 DL
	Matrix:	WATER	WATER	WATER	WATER	WATER	WATER
	D.F.:	1.00	25.0	1.00	5.00	1.00	10.0
	Units:	UG/L	UG/L	UG/L	UG/L	UG/L	UG/L

Bromofluorobenzene	106 % fl	117 % fl	99 % fl	113 % fl	94 % fl	115 % fl
Dichlorodifluoromethane	0.3 U	NA	0.3 U	NA	0.3 U	NA
Chloromethane	0.2 U	NA	0.2 U	NA	0.2 U	NA
Bromomethane	0.1 U	NA	0.1 U	NA	0.1 U	NA
Vinyl Chloride	0.2 U	NA	0.2 U	NA	35	NA
Chloroethane	0.1 U	NA	0.1 U	NA	0.1 U	NA
Methylene Chloride	8 U	NA	7	NA	8	NA
Trichlorofluoromethane	0.1 U	NA	0.1 U	NA	0.1 U	NA
1,1-Dichloroethene	0.1 U	NA	7	NA	27	NA
1,1-Dichloroethane	E	96	E	38	E	260
cis-1,2-Dichloroethene	0.2 U	NA	6	NA	E	110
2,2-Dichloropropane	0.1 U	NA	0.1 U	NA	0.1 U	NA
trans-1,2-Dichloroethene	0.1 U	NA	0.1 U	NA	0.1 U	NA
Chloroform	0.2 U	NA	0.2 U	NA	0.2 U	NA
Bromochloromethane	0.2 U	NA	0.2 U	NA	0.2 U	NA
1,2-Dichloroethane	0.2 U	NA	0.2 U	NA	0.2 U	NA
1,1,1-Trichloroethane	0.2 U	NA	6	NA	4	NA
Carbon Tetrachloride	0.1 U	NA	0.1 U	NA	0.1 U	NA
1,1-Dichloropropene	0.1 U	NA	0.1 U	NA	0.1 U	NA
Bromodichloromethane	0.2 U	NA	0.2 U	NA	0.2 U	NA
Dibromomethane	0.2 U	NA	0.2 U	NA	0.2 U	NA
1,2-Dichloropropane	0.2 U	NA	0.2 U	NA	0.2 U	NA
Trichloroethene	72	NA	E	69	E	170
Dibromochloromethane	0.2 U	NA	0.2 U	NA	0.2 U	NA
1,2-Dibromoethane	0.2 U	NA	0.2 U	NA	0.2 U	NA
1,1,2-Trichloroethane	0.3 U	NA	0.3 U	NA	0.3 U	NA
Benzene	0.2 U	NA	0.2 U	NA	0.2 U	NA
1,3-Dichloropropane	0.2 U	NA	0.2 U	NA	0.2 U	NA
Bromoform	0.2 U	NA	0.2 U	NA	0.2 U	NA
Tetrachloroethene	0.1 U	NA	0.1 U	NA	0.1 U	NA
1,1,2,2-Tetrachloroethane	0.2 U	NA	0.2 U	NA	0.2 U	NA
Toluene	0.1 U	NA	0.1 U	NA	0.1 U	NA

*= Outside of EPA CLP QC limits.

Cust ID:	S-12-GW Dup	S-12-GW Dup	S-12-FB	S-12-Pump EB	P-3-GW	P-3-GW
RFW#:	010 DL	010 DL	011	012	013	013 DL
Chlorobenzene	NA	NA	0.1 U	0.1 U	0.1 U	NA
1,1,1,2-Tetrachloroethane	NA	NA	0.2 U	0.2 U	0.2 U	NA
Ethylbenzene	NA	NA	0.1 U	0.1 U	0.1 U	NA
Styrene	NA	NA	0.2 U	0.2 U	0.2 U	NA
p-Xylene	NA	NA	0.2 U	0.2 U	0.2 U	NA
m-Xylene	NA	NA	0.2 U	0.2 U	0.2 U	NA
o-Xylene	NA	NA	0.3 U	0.3 U	0.3 U	NA
Bromobenzene	NA	NA	0.1 U	0.1 U	0.1 U	NA
1,2,3-Trichloropropane	NA	NA	0.4 U	0.4 U	0.4 U	NA
Isopropylbenzene	NA	NA	0.2 U	0.2 U	0.2 U	NA
n-Propylbenzene	NA	NA	0.2 U	0.2 U	0.2 U	NA
2-Chlorotoluene	NA	NA	0.2 U	0.2 U	0.2 U	NA
4-Chlorotoluene	NA	NA	0.2 U	0.2 U	0.2 U	NA
1,3,5-Trimethylbenzene	NA	NA	0.1 U	0.1 U	0.1 U	NA
tert-Butylbenzene	NA	NA	0.2 U	0.2 U	0.2 U	NA
1,2,4-Trimethylbenzene	NA	NA	0.3 U	0.3 U	0.3 U	NA
sec-Butylbenzene	NA	NA	0.2 U	0.2 U	0.2 U	NA
p-Isopropyltoluene	NA	NA	0.2 U	0.2 U	0.2 U	NA
1,3-Dichlorobenzene	NA	NA	0.1 U	0.1 U	0.1 U	NA
1,4-Dichlorobenzene	NA	NA	0.3 U	0.3 U	0.3 U	NA
1,2-Dichlorobenzene	NA	NA	0.1 U	0.1 U	0.1 U	NA
n-Butylbenzene	NA	NA	0.1 U	0.1 U	0.1 U	NA
1,2-Dibromo-3-Chloropropane	NA	NA	0.5 U	0.5 U	0.5 U	NA
1,2,4-Trichlorobenzene	NA	NA	0.2 U	0.2 U	0.2 U	NA
Hexachlorobutadiene	NA	NA	0.4 U	0.4 U	0.4 U	NA
Naphthalene	NA	NA	0.2 U	0.2 U	0.2 U	NA
1,2,3-Trichlorobenzene	NA	NA	0.1 U	0.1 U	0.1 U	NA
cis-1,3-Dichloropropene	NA	NA	0.1 U	0.1 U	0.1 U	NA
trans-1,3-Dichloropropene	NA	NA	0.3 U	0.3 U	0.3 U	NA
Acetone	NA	NA	2 U	2 U	2 U	NA
Carbon Disulfide	NA	NA	0.1 U	0.1 U	0.1 U	NA
2-Butanone	NA	NA	0.3 U	0.3 U	0.3 U	NA
Vinyl Acetate	NA	NA	0.3 U	0.3 U	0.3 U	NA
4-Methyl-2-pentanone	NA	NA	0.4 U	0.4 U	0.4 U	NA
2-Hexanone	NA	NA	0.5 U	0.5 U	0.5 U	NA
2-Chloroethylvinylether	NA	NA	0.2 U	0.2 U	0.2 U	NA

*= Outside of EPA CLP QC limits.

Roy F. Weston, Inc. - Gulf Coast Laboratories
VOLATILES BY GC/MS, METHOD 524 LIST

RFW Batch Number: 9203G478 Client: Ekco Houseware Work Order: 2994-02-03-0000 Report Date: 04/15/92 11:21 Page: 3a

	Cust ID:	S-12-GW Dup	S-12-GW Dup	S-12-FB	S-12-Pump EB	P-3-GW	P-3-GW
Sample Information	RFW#:	010 DL	010 DL	011	012	013	013 DL
	Matrix:	WATER	WATER	WATER	WATER	WATER	WATER
	D.F.:	2.00	500	1.00	1.00	1.00	5.00
	Units:	UG/L	UG/L	UG/L	UG/L	UG/L	UG/L

Bromofluorobenzene	107 % fl	108 % fl	107 % fl	109 % fl	99 % fl	111 % fl
Dichlorodifluoromethane	NA	NA	0.3 U	0.3 U	0.3 U	NA
Chloromethane	NA	NA	0.2 U	0.2 U	0.2 U	NA
Bromomethane	NA	NA	0.1 U	0.1 U	0.1 U	NA
Vinyl Chloride	NA	NA	0.2 U	0.2 U	0.2 U	NA
Chloroethane	NA	NA	0.1 U	0.1 U	0.1 U	NA
Methylene Chloride	NA	NA	4	3	0.6 U	NA
Trichlorofluoromethane	NA	NA	0.7	0.5	0.1 U	NA
1,1-Dichloroethene	NA	NA	0.1 U	0.1 U	6	NA
1,1-Dichloroethane	NA	NA	0.1 U	0.1 U	E	84
cis-1,2-Dichloroethene	15	NA	0.2 U	0.2 U	6	NA
2,2-Dichloropropane	NA	NA	0.1 U	0.1 U	0.1 U	NA
trans-1,2-Dichloroethene	NA	NA	0.1 U	0.1 U	0.1 U	NA
Chloroform	NA	NA	0.2 U	0.2 U	0.2 U	NA
Bromochloromethane	NA	NA	0.2 U	0.2 U	0.2 U	NA
1,2-Dichloroethane	NA	NA	0.2 U	0.2 U	0.2 U	NA
1,1,1-Trichloroethane	NA	NA	0.2 U	0.2 U	E	92
Carbon Tetrachloride	NA	NA	0.1 U	0.1 U	0.1 U	NA
1,1-Dichloropropene	NA	NA	0.1 U	0.1 U	0.1 U	NA
Bromodichloromethane	NA	NA	0.2 U	0.2 U	0.2 U	NA
Dibromomethane	NA	NA	0.2 U	0.2 U	0.2 U	NA
1,2-Dichloropropane	NA	NA	0.2 U	0.2 U	0.2 U	NA
Trichloroethene	E	2000	0.8	0.3 U	E	62
Dibromochloromethane	NA	NA	0.2 U	0.2 U	0.2 U	NA
1,2-Dibromoethane	NA	NA	0.2 U	0.2 U	0.2 U	NA
1,1,2-Trichloroethane	NA	NA	0.3 U	0.3 U	0.3 U	NA
Benzene	NA	NA	0.2 U	0.2 U	0.2 U	NA
1,3-Dichloropropane	NA	NA	0.2 U	0.2 U	0.2 U	NA
Bromoform	NA	NA	0.2 U	0.2 U	0.2 U	NA
Tetrachloroethene	NA	NA	0.1 U	0.1 U	0.1 U	NA
1,1,2,2-Tetrachloroethane	NA	NA	0.2 U	0.2 U	0.2 U	NA
Toluene	NA	NA	0.1 U	0.1 U	0.1 U	NA

*= Outside of EPA CLP QC limits.

RFW Batch Number: 9203G478 Client: Ekco Houseware Work Order: 2994-02-03-0000 Page: 2b

	Cust ID:	I-13-GW	I-13-GW	I-14-GW	Trip Blank A	Trip Blank B	S-12-GW Dup
	RFW#:	006 MS	006 MSD	007	008	009	010
Chlorobenzene		162 * %	160 * %	0.1 U	0.1 U	0.1 U	0.1 U
1,1,1,2-Tetrachloroethane		0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
Ethylbenzene		0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
Styrene		0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
p-Xylene		0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
m-Xylene		0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
o-Xylene		0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
Bromobenzene		0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
1,2,3-Trichloropropane		0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U
Isopropylbenzene		0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
n-Propylbenzene		0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
2-Chlorotoluene		0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
4-Chlorotoluene		0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
1,3,5-Trimethylbenzene		0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
tert-Butylbenzene		0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
1,2,4-Trimethylbenzene		0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
sec-Butylbenzene		0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
p-Isopropyltoluene		0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
1,3-Dichlorobenzene		0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
1,4-Dichlorobenzene		0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
1,2-Dichlorobenzene		0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
n-Butylbenzene		0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
1,2-Dibromo-3-Chloropropane		0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,2,4-Trichlorobenzene		0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
Hexachlorobutadiene		0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U
Naphthalene		0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
1,2,3-Trichlorobenzene		0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
cis-1,3-Dichloropropene		0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
trans-1,3-Dichloropropene		0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
Acetone		2 U	2 U	2 U	2 U	2 U	2 U
Carbon Disulfide		2	2	0.1 U	0.1 U	0.1 U	0.1 U
2-Butanone		0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
Vinyl Acetate		0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
4-Methyl-2-pentanone		0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U
2-Hexanone		0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
2-Chloroethylvinylether		0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U

*= Outside of EPA CLP QC limits.

Roy F. Weston, Inc. - Gulf Coast Laboratories
VOLATILES BY GC/MS, METHOD 524 LIST

RFW Batch Number: 9203G478 Client: Ekco Houseware Work Order: 2994-02-03-0000 Report Date: 04/15/92 11:21 Page: 2a

Sample Information	Cust ID:	I-13-GW	I-13-GW	I-14-GW	Trip Blank A	Trip Blank B	S-12-GW Dup
	RFW#:	006 MS	006 MSD	007	008	009	010
	Matrix:	WATER	WATER	WATER	WATER	WATER	WATER
	D.F.:	1.00	1.00	1.00	1.00	1.00	1.00
	Units:	UG/L	UG/L	UG/L	UG/L	UG/L	UG/L

Bromofluorobenzene	98 %	102 %	98 %	100 %	96 %	100 %
Dichlorodifluoromethane	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
Chloromethane	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
Bromomethane	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
Vinyl Chloride	5	5	0.2 U	0.2 U	0.2 U	2
Chloroethane	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
Methylene Chloride	7	2	6	6	6	2
Trichlorofluoromethane	1	1	0.8	0.1 U	0.1 U	0.8
1,1-Dichloroethene	215 * %	202 * %	0.1 U	0.1 U	0.1 U	0.1 U
1,1-Dichloroethane	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
cis-1,2-Dichloroethene	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	E
2,2-Dichloropropane	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
trans-1,2-Dichloroethene	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
Chloroform	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
Bromochloromethane	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
1,2-Dichloroethane	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
1,1,1-Trichloroethane	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	3
Carbon Tetrachloride	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
1,1-Dichloropropene	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
Bromodichloromethane	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
Dibromomethane	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
1,2-Dichloropropane	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
Trichloroethene	274 * %	241 * %	0.3 U	0.3 U	0.3 U	E
Dibromochloromethane	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
1,2-Dibromoethane	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
1,1,2-Trichloroethane	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
Benzene	162 * %	160 * %	0.2 U	0.2 U	0.2 U	0.2 U
1,3-Dichloropropane	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
Bromoform	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
Tetrachloroethene	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
1,1,2,2-Tetrachloroethane	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
Toluene	141 * %	139 * %	0.1 U	0.1 U	0.1 U	0.1 U

*= Outside of EPA CLP QC limits.

RFW Batch Number: 9203G478 Client: Ekco Houseware Work Order: 2994-02-03-0000 Page: 1b

Cust ID:	I-8D-GW	I-9-GW	I-10-GW	I-11-GW	I-12-GW	I-13-GW
RFW#:	001	002	003	004	005	006
Chlorobenzene	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
1,1,1,2-Tetrachloroethane	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
Ethylbenzene	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
Styrene	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
p-Xylene	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
m-Xylene	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
o-Xylene	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
Bromobenzene	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
1,2,3-Trichloropropane	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U
Isopropylbenzene	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
n-Propylbenzene	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
2-Chlorotoluene	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
4-Chlorotoluene	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
1,3,5-Trimethylbenzene	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
tert-Butylbenzene	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
1,2,4-Trimethylbenzene	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
sec-Butylbenzene	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
p-Isopropyltoluene	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
1,3-Dichlorobenzene	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
1,4-Dichlorobenzene	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
1,2-Dichlorobenzene	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
n-Butylbenzene	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
1,2-Dibromo-3-Chloropropane	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,2,4-Trichlorobenzene	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
Hexachlorobutadiene	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U
Naphthalene	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
1,2,3-Trichlorobenzene	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
cis-1,3-Dichloropropene	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
trans-1,3-Dichloropropene	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
Acetone	2 U	2 U	2 U	2 U	2 U	2 U
Carbon Disulfide	0.1 U	0.1 U	0.1 U	8	1	1
2-Butanone	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
Vinyl Acetate	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
4-Methyl-2-pentanone	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U
2-Hexanone	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
2-Chloroethylvinylether	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U

*= Outside of EPA CLP QC limits.

Roy F. Weston, Inc. - Gulf Coast Laboratories
VOLATILES BY GC/MS, METHOD 524 LIST

RFW Batch Number: 92036478 Client: Ekco Houseware Work Order: 2994-02-03-0000 Report Date: 04/15/92 11:21 Page: 1a

	Cust ID:	I-8D-GW	I-9-GW	I-10-GW	I-11-GW	I-12-GW	I-13-GW
Sample Information	RFW#:	001	002	003	004	005	006
	Matrix:	WATER	WATER	WATER	WATER	WATER	WATER
	D.F.:	1.00	1.00	1.00	1.00	1.00	1.00
	Units:	UG/L	UG/L	UG/L	UG/L	UG/L	UG/L

Bromofluorobenzene	105 %	f	102 %	f	98 %	f	99 %	f	102 %	f	103 %	f
Dichlorodifluoromethane	0.3	U	0.3	U	0.3	U	0.3	U	0.3	U	0.3	U
Chloromethane	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U
Bromomethane	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U
Vinyl Chloride	0.2	U	7		0.2	U	9		0.2	U	3	
Chloroethane	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U
Methylene Chloride	5		5		9		5		4		4	
Trichlorofluoromethane	0.1	U	1		0.1	U	1		0.8		0.7	
1,1-Dichloroethene	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U
1,1-Dichloroethane	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U
cis-1,2-Dichloroethene	0.2	U	3		0.2	U	0.2	U	0.2	U	0.2	U
2,2-Dichloropropane	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U
trans-1,2-Dichloroethene	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U
Chloroform	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U
Bromochloromethane	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U
1,2-Dichloroethane	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U
1,1,1-Trichloroethane	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U
Carbon Tetrachloride	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U
1,1-Dichloropropene	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U
Bromodichloromethane	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U
Dibromomethane	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U
1,2-Dichloropropane	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U
Trichloroethene	0.3	U	0.3	U	0.3	U	0.3	U	0.3	U	0.3	U
Dibromochloromethane	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U
1,2-Dibromoethane	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U
1,1,2-Trichloroethane	0.3	U	0.3	U	0.3	U	0.3	U	0.3	U	0.3	U
Benzene	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U
1,3-Dichloropropane	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U
Bromoform	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U
Tetrachloroethene	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U
1,1,2,2-Tetrachloroethane	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U
Toluene	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U

*= Outside of EPA CLP QC limits.

Cust ID:	VBLK BS	VBLK	VBLK BS	VBLK	VBLK BS
RFW#:	92GVE087-MB1	92GVE097-MB1	92GVE097-MB1	92GVE099-MB1	92GVE099-MB1
Toluene	82 %	1 U	95 %	1 U	92 %
Chlorobenzene	84 %	1 U	96 %	1 U	99 %
Ethylbenzene	1 U	1 U	1 U	1 U	1 U
Styrene	1 U	1 U	1 U	1 U	1 U
Xylene (total)	1 U	1 U	1 U	1 U	1 U

*= Outside of EPA CLP QC limits.

Roy F. Weston, Inc. - Gulf Coast Laboratories
VOLATILES BY GC/MS, HSL LIST

RFW Batch Number: 92036477 Client: Ekco Houseware Work Order: 2994-02-03-0000 Report Date: 04/20/92 10:51 Page: 6a

	Cust ID:	VBLK BS	VBLK	VBLK BS	VBLK	VBLK BS
Sample Information	RFW#:	92GVE087-MB1	92GVE097-MB1	92GVE097-MB1	92GVE099-MB1	92GVE099-MB1
	Matrix:	WATER	WATER	WATER	WATER	WATER
	D.F.:	1.00	1.00	1.00	1.00	1.00
	Units:	ug/L	ug/L	ug/L	ug/L	ug/L
Surrogate Recovery	Toluene-d8	96 %	102 %	101 %	102 %	94 %
	Bromofluorobenzene	90 %	100 %	101 %	100 %	102 %
	1,2-Dichloroethane-d4	76 %	92 %	93 %	92 %	97 %
Chloromethane		2 U	2 U	2 U	2 U	2 U
Bromomethane		2 U	2 U	2 U	2 U	2 U
Vinyl Chloride		1 U	1 U	1 U	1 U	1 U
Chloroethane		2 U	2 U	2 U	2 U	2 U
Methylene Chloride		1 U	1 U	1 U	1 U	1 U
Acetone		2 U	4	5 B	4	4 B
Carbon Disulfide		1 U	1 U	1 U	1 U	1 U
1,1-Dichloroethene		101 %	1 U	110 %	1 U	102 %
1,1-Dichloroethane		1 U	1 U	1 U	1 U	1 U
1,2-Dichloroethene (total)		1 U	1 U	1 U	1 U	1 U
Chloroform		1 U	1 U	1 U	1 U	1 U
1,2-Dichloroethane		1 U	1 U	1 U	1 U	1 U
2-Butanone		2 U	2 U	2 U	2 U	2 U
1,1,1-Trichloroethane		1 U	1 U	1 U	1 U	1 U
Carbon Tetrachloride		1 U	1 U	1 U	1 U	1 U
Vinyl Acetate		2 U	2 U	2 U	2 U	2 U
Bromodichloromethane		1 U	1 U	1 U	1 U	1 U
1,2-Dichloropropane		1 U	1 U	1 U	1 U	1 U
cis-1,3-Dichloropropene		1 U	1 U	1 U	1 U	1 U
Trichloroethene		111 %	1 U	102 %	1 U	130 * %
Dibromochloromethane		1 U	1 U	1 U	1 U	1 U
1,1,2-Trichloroethane		1 U	1 U	1 U	1 U	1 U
Benzene		97 %	1 U	97 %	1 U	133 * %
Trans-1,3-Dichloropropene		1 U	1 U	1 U	1 U	1 U
Bromoform		1 U	1 U	1 U	1 U	1 U
4-Methyl-2-pentanone		2 U	2 U	2 U	2 U	2 U
2-Hexanone		2 U	2 U	2 U	2 U	2 U
Tetrachloroethene		1 U	1 U	1 U	1 U	1 U
1,1,2,2-Tetrachloroethane		1 U	1 U	1 U	1 U	1 U

*= Outside of EPA CLP QC limits.

Cust ID:	Trip Blank A	Trip Blank A	Trip Blank B	VBLK	VBLK BS	VBLK
RFW#:	012	012 REPREP	013	92GVE086-MB1	92GVE086-MB1	92GVE087-MB1
Toluene	1 U	1 U	1 U	1 U	105 %	1 U
Chlorobenzene	1 U	1 U	1 U	1 U	104 %	1 U
Ethylbenzene	1 U	1 U	1 U	1 U	2 U	1 U
Styrene	1 U	1 U	1 U	1 U	2 U	1 U
Xylene (total)	1 U	1 U	1 U	1 U	2 U	1 U

*= Outside of EPA CLP QC limits.

Roy F. Weston, Inc. - Gulf Coast Laboratories
VOLATILES BY GC/MS, HSL LIST

RFW Batch Number: 9203G477 Client: Ekco Houseware Report Date: 04/20/92 10:51
Work Order: 2994-02-03-0000 Page: 5a

Sample Information	Cust ID:	Trip Blank A	Trip Blank A	Trip Blank B	VBLK	VBLK BS	VBLK
	RFW#:	012	012 REPREP	013	92GVE086-MB1	92GVE086-MB1	92GVE087-MB1
	Matrix:	WATER	WATER	WATER	WATER	WATER	WATER
	D.F.:	1.00	1.00	1.00	1.00	2.00	1.00
	Units:	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
Surrogate Recovery	Toluene-d8	97 %	107 %	98 %	100 %	103 %	97 %
	Bromofluorobenzene	92 %	93 %	90 %	101 %	97 %	101 %
	1,2-Dichloroethane-d4	121 * %	94 %	80 %	106 %	70 * %	93 %
		fl	fl	fl	fl	fl	fl
Chloromethane		2 U	2 U	2 U	2 U	4 U	2 U
Bromomethane		2 U	2 U	2 U	2 U	4 U	2 U
Vinyl Chloride		1 U	1 U	1 U	1 U	2 U	1 U
Chloroethane		2 U	2 U	2 U	2 U	4 U	2 U
Methylene Chloride		14	4	4	1 U	2 U	1 U
Acetone		6	5 B	5	2 U	4 U	2 U
Carbon Disulfide		1 U	1 U	1 U	1 U	2 U	1 U
1,1-Dichloroethene		1 U	1 U	1 U	1 U	122 %	1 U
1,1-Dichloroethane		1 U	1 U	1 U	1 U	2 U	1 U
1,2-Dichloroethene (total)		1 U	1 U	1 U	1 U	2 U	1 U
Chloroform		1 U	1 U	1 U	1 U	2 U	1 U
1,2-Dichloroethane		1 U	1 U	1 U	1 U	2 U	1 U
2-Butanone		2 U	2 U	2 U	2 U	4 U	2 U
1,1,1-Trichloroethane		1 U	1 U	1 U	1 U	2 U	1 U
Carbon Tetrachloride		1 U	1 U	1 U	1 U	2 U	1 U
Vinyl Acetate		2 U	2 U	2 U	2 U	4 U	2 U
Bromodichloromethane		1 U	1 U	1 U	1 U	2 U	1 U
1,2-Dichloropropane		1 U	1 U	1 U	1 U	2 U	1 U
cis-1,3-Dichloropropene		1 U	1 U	1 U	1 U	2 U	1 U
Trichloroethene		3	4	2	1 U	114 %	1 U
Dibromochloromethane		1 U	1 U	1 U	1 U	2 U	1 U
1,1,2-Trichloroethane		1 U	1 U	1 U	1 U	2 U	1 U
Benzene		1 U	1 U	1 U	1 U	107 %	1 U
Trans-1,3-Dichloropropene		1 U	1 U	1 U	1 U	2 U	1 U
Bromoform		1 U	1 U	1 U	1 U	2 U	1 U
4-Methyl-2-pentanone		2 U	2 U	2 U	2 U	4 U	2 U
2-Hexanone		2 U	2 U	2 U	2 U	4 U	2 U
Tetrachloroethene		1 U	1 U	1 U	1 U	2 U	1 U
1,1,2,2-Tetrachloroethane		1 U	1 U	1 U	1 U	2 U	1 U

*= Outside of EPA CLP QC limits.

Cust ID:	W-10-GW	W-10-GW	S-7-GW	S-7-GW	S-7-GW	S-7-FB
RFW#:	009 DL	009 DL	010	010 MS	010 MSD	011
Toluene	NA	NA	1 U	82 %	84 %	1 U
Chlorobenzene	NA	NA	1 U	84 %	85 %	1 U
Ethylbenzene	NA	NA	1 U	1 U	1 U	1 U
Styrene	NA	NA	1 U	1 U	1 U	1 U
Xylene (total)	NA	NA	1 U	1 U	1 U	1 U

*= Outside of EPA CLP QC limits.

Roy F. Weston, Inc. - Gulf Coast Laboratories
VOLATILES BY GC/MS, HSL LIST

RFW Batch Number: 9203G477 Client: Ekco Houseware Work Order: 2994-02-03-0000 Report Date: 04/20/92 10:51 Page: 4a

	Cust ID:	W-10-GW	W-10-GW	S-7-GW	S-7-GW	S-7-GW	S-7-FB
Sample Information	RFW#:	009 DL	009 DL	010	010 MS	010 MSD	011
	Matrix:	WATER	WATER	WATER	WATER	WATER	WATER
	D.F.:	20.0	200	1.00	1.00	1.00	1.00
	Units:	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
Surrogate Recovery	Toluene-d8	101 %	101 %	101 %	97 %	92 %	103 %
	Bromofluorobenzene	102 %	105 %	91 %	95 %	95 %	90 %
	1,2-Dichloroethane-d4	99 %	101 %	97 %	78 %	130 * %	84 %
Chloromethane		NA	NA	2 U	2 U	2 U	2 U
Bromomethane		NA	NA	2 U	2 U	2 U	2 U
Vinyl Chloride		NA	NA	1 U	1 U	1 U	1 U
Chloroethane		NA	NA	2 U	2 U	2 U	2 U
Methylene Chloride		NA	NA	4 U	3	4	4
Acetone		NA	NA	2 U	2 U	2 U	2 U
Carbon Disulfide		NA	NA	1 U	1 U	1 U	1 U
1,1-Dichloroethene		NA	NA	1 U	95 %	92 %	1 U
1,1-Dichloroethane		100	NA	73	2	2	1 U
1,2-Dichloroethene (total)		200	NA	1 U	1 U	1 U	1 U
Chloroform		NA	NA	1 U	1 U	1 U	1 U
1,2-Dichloroethane		NA	NA	1 U	1 U	1 U	1 U
2-Butanone		NA	NA	2 U	2 U	2 U	2 U
1,1,1-Trichloroethane		E	1600	77	6	7	1 U
Carbon Tetrachloride		NA	NA	1 U	1 U	1 U	1 U
Vinyl Acetate		NA	NA	2 U	2 U	2 U	2 U
Bromodichloromethane		NA	NA	1 U	1 U	1 U	1 U
1,2-Dichloropropane		NA	NA	1 U	1 U	1 U	1 U
cis-1,3-Dichloropropene		NA	NA	1 U	1 U	1 U	1 U
Trichloroethene		E	790	9	85 %	74 %	2
Dibromochloromethane		NA	NA	1 U	1 U	1 U	1 U
1,1,2-Trichloroethane		NA	NA	1 U	1 U	1 U	1 U
Benzene		NA	NA	1 U	101 %	149 * %	1 U
Trans-1,3-Dichloropropene		NA	NA	1 U	1 U	1 U	1 U
Bromoform		NA	NA	1 U	1 U	1 U	1 U
4-Methyl-2-pentanone		NA	NA	2 U	2 U	2 U	2 U
2-Hexanone		NA	NA	2 U	2 U	2 U	2 U
Tetrachloroethene		NA	NA	1 U	1 U	1 U	1 U
1,1,2,2-Tetrachloroethane		NA	NA	1 U	1 U	1 U	1 U

*= Outside of EPA CLP QC limits.

Cust ID:	I-2-GW-Dup	I-5-GW	I-6-GW	W-1-GW	W-1-GW	W-10-GW
RFW#:	005 DL	006	007	008	008 DL	009
Toluene	NA	1 U	1 U	1 U	NA	0.6 J
Chlorobenzene	NA	1 U	1 U	1 U	NA	1 U
Ethylbenzene	NA	1 U	1 U	1 U	NA	1 U
Styrene	NA	1 U	1 U	1 U	NA	1 U
Xylene (total)	NA	1 U	1 U	1 U	NA	1 U

*= Outside of EPA CLP QC limits.

Roy F. Weston, Inc. - Gulf Coast Laboratories
VOLATILES BY GC/MS, HSL LIST

RFW Batch Number: 9203G477 Client: Ekco Houseware Work Order: 2994-02-03-0000 Report Date: 04/20/92 10:51 Page: 3a

Sample Information	Cust ID:	I-2-GW-Dup		I-5-GW		I-6-GW		W-1-GW		W-1-GW		W-10-GW	
	RFW#:	005 DL		006		007		008		008 DL		009	
	Matrix:	WATER		WATER		WATER		WATER		WATER		WATER	
	D.F.:	50.0		1.00		1.00		1.00		5.00		1.00	
	Units:	ug/L		ug/L		ug/L		ug/L		ug/L		ug/L	
Surrogate Recovery	Toluene-d8	98	%	101	%	105	%	97	%	99	%	98	%
	Bromofluorobenzene	102	%	100	%	98	%	90	%	100	%	90	%
	1,2-Dichloroethane-d4	97	%	78	%	100	%	80	%	92	%	79	%
			fl		fl		fl		fl		fl		fl
Chloromethane		NA		2	U	2	U	2	U	NA		2	U
Bromomethane		NA		2	U	2	U	2	U	NA		2	U
Vinyl Chloride		NA		1	U	1	U	1	U	NA		3	
Chloroethane		NA		2	U	2	U	2	U	NA		2	U
Methylene Chloride		NA		3	U	4		3		NA		3	
Acetone		NA		2	U	2	U	2	U	NA		2	U
Carbon Disulfide		NA		1	U	1	U	1	U	NA		1	U
1,1-Dichloroethene		NA		1	U	1	U	8		NA		21	
1,1-Dichloroethane		920		18		1	U		E	70			E
1,2-Dichloroethene (total)		150		1	U	1	U	12		NA			E
Chloroform		NA		1	U	1	U	1	U	NA		1	U
1,2-Dichloroethane		NA		1	U	1	U	1	U	NA		1	U
2-Butanone		NA		2	U	2	U	2	U	NA		2	U
1,1,1-Trichloroethane		NA		1	U	1	U		E	37			E
Carbon Tetrachloride		NA		1	U	1	U	1	U	NA		1	U
Vinyl Acetate		NA		2	U	2	U	2	U	NA		2	U
Bromodichloromethane		NA		1	U	1	U	1	U	NA		1	U
1,2-Dichloropropane		NA		1	U	1	U	1	U	NA		1	U
cis-1,3-Dichloropropene		NA		1	U	1	U	1	U	NA		1	U
Trichloroethene		520		1		1			E	140			E
Dibromochloromethane		NA		1	U	1	U	1	U	NA		1	U
1,1,2-Trichloroethane		NA		1	U	1	U	1	U	NA		1	U
Benzene		NA		1	U	1	U	1	U	NA		1	U
Trans-1,3-Dichloropropene		NA		1	U	1	U	1	U	NA		1	U
Bromoform		NA		1	U	1	U	1	U	NA		1	U
4-Methyl-2-pentanone		NA		2	U	2	U	2	U	NA		2	U
2-Hexanone		NA		2	U	2	U	2	U	NA		2	U
Tetrachloroethene		NA		1	U	1	U	1	U	NA		1	U
1,1,2,2-Tetrachloroethane		NA		1	U	1	U	1	U	NA		1	U

*- Outside of EPA CLP QC limits.

Cust ID:	D-4-30-GW	I-2-GW	I-2-GW	I-2-GW	I-2-GW-Dup	I-2-GW-Dup
RFW#:	003 DL	004	004 DL	004 DL	005	005 DL
Toluene	NA	1 U	NA	NA	1 U	NA
Chlorobenzene	NA	1 U	NA	NA	1 U	NA
Ethylbenzene	NA	1 U	NA	NA	1 U	NA
Styrene	NA	1 U	NA	NA	1 U	NA
Xylene (total)	NA	1 U	NA	NA	1 U	NA

*= Outside of EPA CLP QC limits.

Roy F. Weston, Inc. - Gulf Coast Laboratories
VOLATILES BY GC/MS, HSL LIST

RFW Batch Number: 92036477 Client: Ekco Houseware Work Order: 2994-02-03-0000 Report Date: 04/20/92 10:51 Page: 2a

	Cust ID:	D-4-30-GW	I-2-GW	I-2-GW	I-2-GW	I-2-GW-Dup	I-2-GW-Dup
Sample Information	RFW#:	003 DL	004	004 DL	004 DL	005	005 DL
	Matrix:	WATER	WATER	WATER	WATER	WATER	WATER
	D.F.:	4000	1.00	5.00	50.0	1.00	5.00
	Units:	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
Surrogate Recovery	Toluene-d8	95 %	94 %	103 %	102 %	96 %	99 %
	Bromofluorobenzene	103 %	91 %	97 %	101 %	93 %	97 %
	1,2-Dichloroethane-d4	99 %	78 %	94 %	97 %	75 * %	108 %
		fl	fl	fl	fl	fl	fl
Chloromethane		NA	2 U	NA	NA	2 U	NA
Bromomethane		NA	2 U	NA	NA	2 U	NA
Vinyl Chloride		NA	E	29	NA	E	23
Chloroethane		NA	5	NA	NA	[illegible]	NA
Methylene Chloride		NA	3 U	NA	NA	4 U	NA
Acetone		NA	2 U	NA	NA	2 U	NA
Carbon Disulfide		NA	1 U	NA	NA	1 U	NA
1,1-Dichloroethene		NA	E	70	NA	E	66
1,1-Dichloroethane		NA	E	E	980	E	E
1,2-Dichloroethene (total)		NA	E	E	160	E	E
Chloroform		NA	1 U	NA	NA	1 U	NA
1,2-Dichloroethane		NA	1 U	NA	NA	21	NA
2-Butanone		NA	2 U	NA	NA	2 U	NA
1,1,1-Trichloroethane		NA	E	27	NA	25	NA
Carbon Tetrachloride		NA	1 U	NA	NA	1 U	NA
Vinyl Acetate		NA	2 U	NA	NA	2 U	NA
Bromodichloromethane		NA	1 U	NA	NA	1 U	NA
1,2-Dichloropropane		NA	1 U	NA	NA	1 U	NA
cis-1,3-Dichloropropene		NA	1 U	NA	NA	1 U	NA
Trichloroethene		25000	E	E	490	E	E
Dibromochloromethane		NA	1 U	NA	NA	1 U	NA
1,1,2-Trichloroethane		NA	1 U	NA	NA	1 U	NA
Benzene		NA	1 U	NA	NA	1 U	NA
Trans-1,3-Dichloropropene		NA	1 U	NA	NA	1 U	NA
Bromoform		NA	1 U	NA	NA	1 U	NA
4-Methyl-2-pentanone		NA	2 U	NA	NA	2 U	NA
2-Hexanone		NA	2 U	NA	NA	2 U	NA
Tetrachloroethene		NA	1 U	NA	NA	1 U	NA
1,1,2,2-Tetrachloroethane		NA	1 U	NA	NA	1 U	NA

*= Outside of EPA CLP QC limits.

Roy F. Weston, Inc. - Gulf Coast Laboratories
VOLATILES BY GC/MS, HSL LIST

RFW Batch Number: 9109G745 Client: Ekco Houseware Work Order: 2994-02-03-0000 Report Date: 10/15/91 14:05 Page: 3a

	Cust ID:	D-4-30	VBLK	VBLK BS	VBLK	VBLK BS	VBLK
Sample Information	RFW#:	005 DL	91GVB342-MB1	91GVB342-MB1	91GVB343-MB1	91GVB343-MB1	91GVB344-MB1
	Matrix:	WATER	WATER	WATER	WATER	WATER	WATER
	D.F.:	500	1.00	1.00	1.00	1.00	1.00
	Units:	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
Surrogate Recovery	Toluene-d8	104 %	101 %	101 %	96 %	105 %	99 %
	Bromofluorobenzene	104 %	102 %	107 %	107 %	118 * %	100 %
	1,2-Dichloroethane-d4	104 %	93 %	104 %	101 %	112 %	95 %
Chloromethane		NA	10 U	10 U	10 U	10 U	10 U
Bromomethane		NA	10 U	10 U	10 U	10 U	10 U
Vinyl Chloride		NA	10 U	10 U	10 U	10 U	10 U
Chloroethane		NA	10 U	10 U	10 U	10 U	10 U
Methylene Chloride		NA	5 U	5 U	3 J	15 B	5 U
Acetone		NA	17	10 U	8 J	10 U	10 U
Carbon Disulfide		NA	5 U	5 U	5 U	5 U	5 U
1,1-Dichloroethene		NA	5 U	85 %	5 U	90 %	5 U
1,1-Dichloroethane		NA	5 U	5 U	5 U	5 U	5 U
1,2-Dichloroethene (total)		NA	5 U	5 U	5 U	5 U	5 U
Chloroform		NA	5 U	5 U	5 U	5 U	5 U
1,2-Dichloroethane		NA	5 U	5 U	5 U	5 U	5 U
2-Butanone		NA	10 U	10 U	10 U	10 U	10 U
1,1,1-Trichloroethane		NA	5 U	11	5 U	5 U	5 U
Carbon Tetrachloride		NA	5 U	5 U	5 U	5 U	5 U
Vinyl Acetate		NA	10 U	10 U	10 U	10 U	10 U
Bromodichloromethane		NA	5 U	5 U	5 U	5 U	5 U
1,2-Dichloropropane		NA	5 U	5 U	5 U	5 U	5 U
cis-1,3-Dichloropropene		NA	5 U	5 U	5 U	5 U	5 U
Trichloroethene		75000	5 U	246 * %	5 U	99 %	5 U
Dibromochloromethane		NA	5 U	5 U	5 U	5 U	5 U
1,1,2-Trichloroethane		NA	5 U	5 U	5 U	5 U	5 U
Benzene		NA	5 U	96 %	5 U	103 %	5 U
Trans-1,3-Dichloropropene		NA	5 U	5 U	5 U	5 U	5 U
Bromoform		NA	5 U	5 U	5 U	5 U	5 U
4-Methyl-2-pentanone		NA	10 U	10 U	10 U	10 U	10 U
2-Hexanone		NA	10 U	10 U	10 U	10 U	10 U
Tetrachloroethene		NA	5 U	5 U	5 U	5 U	5 U
1,1,2,2-Tetrachloroethane		NA	5 U	5 U	5 U	5 U	5 U

*= Outside of EPA CLP QC limits.

RFW Batch Number: 9109G745 Client: Ekco Houseware Work Order: 2994-02-03-0000 Page: 3b

Cust ID:	D-4-30	VBLK	VBLK BS	VBLK	VBLK BS	VBLK
RFW#:	005 DL	91GVB342-MB1	91GVB342-MB1	91GVB343-MB1	91GVB343-MB1	91GVB344-MB1
Toluene	NA	5 U	92 %	5 U	98 %	5 U
Chlorobenzene	NA	5 U	94 %	5 U	94 %	5 U
Ethylbenzene	NA	5 U	5 U	5 U	5 U	5 U
Styrene	NA	5 U	5 U	5 U	5 U	5 U
Xylene (total)	NA	5 U	5 U	5 U	5 U	5 U
2-Chloroethylvinylether	NA	10 U	10 U	10 U	10 U	10 U

*= Outside of EPA CLP QC limits.

Roy F. Weston, Inc. - Gulf Coast Laboratories
VOLATILES BY GC/MS, HSL LIST

RFW Batch Number: 9109G745 Client: Ekco Houseware Work Order: 2994-02-03-0000 Report Date: 10/15/91 14:05 Page: 2a

	Cust ID:	R-5-GW	R-5-GW	R-5-GW	D-4-30	D-4-30	D-4-30
Sample Information	RFW#:	004	004 MS	004 MSD	005	005 DL	005 DL
	Matrix:	WATER	WATER	WATER	WATER	WATER	WATER
	D.F.:	1.00	1.00	1.00	1.00	10.0	100
	Units:	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
Surrogate Recovery	Toluene-d8	100 %	103 %	103 %	108 %	103 %	98 %
	Bromofluorobenzene	106 %	111 %	109 %	108 %	115 %	100 %
	1,2-Dichloroethane-d4	103 %	107 %	106 %	108 %	113 %	100 %
Chloromethane		10 U	10 U	10 U	10 U	NA	NA
Bromomethane		10 U	10 U	10 U	10 U	NA	NA
Vinyl Chloride		34	29	29	10 U	NA	NA
Chloroethane		10 U	10 U	10 U	10 U	NA	NA
Methylene Chloride		5 U	5 U	5 U	16 B	NA	NA
Acetone		10 U	10 U	10 U	9 JB	NA	NA
Carbon Disulfide		5 U	5 U	5 U	5 U	NA	NA
1,1-Dichloroethene		5 U	96 %	89 %	E 930	930	NA
1,1-Dichloroethane		5	7	6	E 1,600	1600	NA
1,2-Dichloroethene (total)		51	54	53	E 290	290	NA
Chloroform		5 U	5 U	5 U	5	NA	NA
1,2-Dichloroethane		5 U	5 U	5 U	84	NA	NA
2-Butanone		10 U	10 U	10 U	10 U	NA	NA
1,1,1-Trichloroethane		5 U	35	17	E 11,000	E	170001 E
Carbon Tetrachloride		5 U	5 U	5 U	5 U	NA	NA
Vinyl Acetate		10 U	10 U	10 U	10 U	NA	NA
Bromodichloromethane		5 U	5 U	5 U	5 U	NA	NA
1,2-Dichloropropane		5 U	5 U	5 U	5 U	NA	NA
cis-1,3-Dichloropropene		5 U	5 U	5 U	5 U	NA	NA
Trichloroethene		20	585 * %	332 * %	E 75,000	E	E
Dibromochloromethane		5 U	5 U	5 U	5 U	NA	NA
1,1,2-Trichloroethane		5 U	5 U	5 U	66	NA	NA
Benzene		5 U	96 %	100 %	5 U	NA	NA
Trans-1,3-Dichloropropene		5 U	5 U	5 U	5 U	NA	NA
Bromoform		5 U	5 U	5 U	5 U	NA	NA
4-Methyl-2-pentanone		10 U	10 U	10 U	10 U	NA	NA
2-Hexanone		10 U	10 U	10 U	10 U	NA	NA
Tetrachloroethene		5 U	5 U	5 U	84	NA	NA
1,1,2,2-Tetrachloroethane		5 U	5 U	5 U	5 U	NA	NA

*= Outside of EPA CLP QC limits.

RFW Batch Number: 9109G745 Client: Ekco Houseware Work Order: 2994-02-03-0000 Page: 2b

Cust ID:	R-5-GW	R-5-GW	R-5-GW	D-4-30	D-4-30	D-4-30
RFW#:	004	004 MS	004 MSD	005	005 DL	005 DL
Toluene	5 U	90 %	95 %	11	NA	NA
Chlorobenzene	5 U	91 %	98 %	5 U	NA	NA
Ethylbenzene	5 U	5 U	5 U	5 U	NA	NA
Styrene	5 U	5 U	5 U	5 U	NA	NA
Xylene (total)	5 U	5 U	5 U	5 U	NA	NA
2-Chloroethylvinylether	10 U	10 U	10 U	10 U	NA	NA

*= Outside of EPA CLP QC limits.

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I-2, I-1, R-5, 2-4-30

Roy F. Weston, Inc. - Gulf Coast Laboratories
VOLATILES BY GC/MS, HSL LIST

RFW Batch Number: 9109G745 Client: Ekco Houseware Work Order: 2994-02-03-0000 Report Date: 10/15/91 14:05 Page: 1a

	Cust ID:	I-7-GW	I-7-GW	I-2-GW	I-2-GW	I-7-GW DUP	I-7-GW DUP
Sample Information	RFW#:	001	001 DL	002	002 DL	003	003 DL
	Matrix:	WATER	WATER	WATER	WATER	WATER	WATER
	D.F.:	1.00	5.00	1.00	5.00	1.00	5.00
	Units:	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
Surrogate Recovery	Toluene-d8	92 %	104 %	100 %	106 %	102 %	104 %
	Bromofluorobenzene	112 %	109 %	108 %	110 %	104 %	108 %
	1,2-Dichloroethane-d4	108 %	111 %	107 %	110 %	102 %	112 %
Chloromethane		10 U	NA	10 U	NA	10 U	NA
Bromomethane		10 U	NA	10 U	NA	10 U	NA
Vinyl Chloride		10 U	NA	42	NA	10 U	NA
Chloroethane		10 U	NA	10 U	NA	10 U	NA
Methylene Chloride		5 U	NA	5 U	NA	5 U	NA
Acetone		10 U	NA	8 JB U	NA	10 U	NA
Carbon Disulfide		5 U	NA	5 U	NA	5 U	NA
1,1-Dichloroethene		5 U	NA	55	NA	7	NA
1,1-Dichloroethane		E 110	440	E 150	950	E 180	480
1,2-Dichloroethene (total)		5 U	NA	130	NA	12	NA
Chloroform		5 U	NA	5 U	NA	5 U	NA
1,2-Dichloroethane		5 U	NA	5 U	NA	5 U	NA
2-Butanone		10 U	NA	10 U	NA	10 U	NA
1,1,1-Trichloroethane		5 U	NA	25	NA	5 U	NA
Carbon Tetrachloride		5 U	NA	5 U	NA	5 U	NA
Vinyl Acetate		10 U	NA	10 U	NA	10 U	NA
Bromodichloromethane		5 U	NA	5 U	NA	5 U	NA
1,2-Dichloropropane		5 U	NA	5 U	NA	5 U	NA
cis-1,3-Dichloropropene		5 U	NA	5 U	NA	5 U	NA
Trichloroethene		5 U	NA	E 160	460	6	NA
Dibromochloromethane		5 U	NA	5 U	NA	5 U	NA
1,1,2-Trichloroethane		5 U	NA	5 U	NA	5 U	NA
Benzene		5 U	NA	5 U	NA	5 U	NA
Trans-1,3-Dichloropropene		5 U	NA	5 U	NA	5 U	NA
Bromoform		5 U	NA	5 U	NA	5 U	NA
4-Methyl-2-pentanone		10 U	NA	10 U	NA	10 U	NA
2-Hexanone		10 U	NA	10 U	NA	10 U	NA
Tetrachloroethene		5 U	NA	5 U	NA	5 U	NA
1,1,2,2-Tetrachloroethane		5 U	NA	5 U	NA	5 U	NA

*= Outside of EPA CLP QC limits.

RFW Batch Number: 9109G745 Client: Ekco Houseware Work Order: 2994-02-03-0000 Page: 1b

Cust ID:	1-7-GW	1-7-GW	1-2-GW	1-2-GW	1-7-GW DUP	1-7-GW DUP
RFW#:	001	001 DL	002	002 DL	003	003 DL
Toluene	5 U	NA	5 U	NA	5 U	NA
Chlorobenzene	5 U	NA	5 U	NA	5 U	NA
Ethylbenzene	5 U	NA	5 U	NA	5 U	NA
Styrene	5 U	NA	5 U	NA	5 U	NA
Xylene (total)	5 U	NA	5 U	NA	5 U	NA
2-Chloroethylvinylether	10 U	NA	10 U	NA	10 U	NA

*= Outside of EPA CLP QC limits.

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Roy F. Weston, Inc. - Gulf Coast Laboratories
VOLATILES BY GC/MS, METHOD 524 LIST

RFW Batch Number: 9109G723 Client: Ekco Houseware Work Order: 2994-02-03-0000 Report Date: 10/11/91 11:25 Page: 2a

	Cust ID:	VBLK	VBLK BS
Sample Information	RFW#:	91GVE242-MB1	91GVE242-MB1
	Matrix:	WATER	WATER
	D.F.:	1.00	1.00
	Units:	UG/L	UG/L

Bromofluorobenzene	113	%	114	%
Dichlorodifluoromethane	0.3	U	0.3	U
Chloromethane	0.2	U	0.2	U
Bromomethane	0.1	U	0.1	U
Vinyl Chloride	0.2	U	0.2	U
Chloroethane	0.1	U	0.1	U
Methylene Chloride	0.6	U	2	
Trichlorofluoromethane	0.1	U	0.1	U
1,1-Dichloroethene	0.1	U	73	%
1,1-Dichloroethane	0.1	U	0.1	U
cis-1,2-Dichloroethene	0.2	U	0.2	U
2,2-Dichloropropane	0.1	U	0.1	U
trans-1,2-Dichloroethene	0.1	U	0.1	U
Chloroform	0.2	U	0.2	U
Bromochloromethane	0.2	U	0.2	U
1,2-Dichloroethane	0.2	U	0.2	U
1,1,1-Trichloroethane	0.2	U	0.2	U
Carbon Tetrachloride	0.1	U	0.1	U
1,1-Dichloropropene	0.1	U	0.1	U
Bromodichloromethane	0.2	U	0.2	U
Dibromomethane	0.2	U	0.2	U
1,2-Dichloropropane	0.2	U	0.2	U
Trichloroethene	0.3	U	83	%
Dibromochloromethane	0.2	U	0.2	U
1,2-Dibromoethane	0.2	U	0.2	U
1,1,2-Trichloroethane	0.3	U	0.3	U
Benzene	0.2	U	87	%
1,3-Dichloropropane	0.2	U	0.2	U
Bromoform	0.2	U	0.2	U
Tetrachloroethene	0.1	U	0.1	U
1,1,2,2-Tetrachloroethane	0.2	U	0.2	U
Toluene	0.1	U	85	%

*= Outside of EPA CLP QC limits.

RFW Batch Number: 9109G723 Client: Ekco Houseware Work Order: 2994-02-03-0000 Page: 2b

Cust ID:	VBLK		VBLK BS	
RFW#:	91GVE242-MB1		91GVE242-MB1	
Chlorobenzene	0.1	U	86	%
1,1,1,2-Tetrachlorethane	0.2	U	0.2	U
Ethylbenzene	0.1	U	0.1	U
Styrene	0.2	U	0.2	U
p-Xylene	0.2	U	0.2	U
m-Xylene	0.2	U	0.2	U
o-Xylene	0.3	U	0.3	U
Bromobenzene	0.1	U	0.1	U
1,2,3-Trichloropropane	0.4	U	0.4	U
Isopropylbenzene	0.2	U	0.2	U
n-Propylbenzene	0.2	U	0.2	U
2-Chlorotoluene	0.2	U	0.2	U
4-Chlorotoluene	0.2	U	0.2	U
1,3,5-Trimethylbenzene	0.1	U	0.1	U
tert-Butylbenzene	0.2	U	0.2	U
1,2,4-Trimethylbenzene	0.3	U	0.3	U
sec-Butylbenzene	0.2	U	0.2	U
p-Isopropyltoluene	0.2	U	0.2	U
1,3-Dichlorobenzene	0.1	U	0.1	U
1,4-Dichlorobenzene	0.3	U	0.3	U
1,2-Dichlorobenzene	0.1	U	0.1	U
n-Butylbenzene	0.1	U	0.1	U
1,2-Dibromo-3-Chloropropane	0.5	U	0.5	U
1,2,4-Trichlorobenzene	0.2	U	0.2	U
Hexachlorobutadiene	0.4	U	0.4	U
Naphthalene	0.2	U	0.2	U
1,2,3-Trichlorobenzene	0.1	U	0.1	U
cis-1,3-Dichloropropene	0.1	U	0.1	U
trans-1,3-Dichloropropene	0.3	U	0.3	U
Acetone	2	U	2	U
Carbon Disulfide	0.1	U	0.1	U
2-Butanone	0.3	U	0.3	U
Vinyl Acetate	0.3	U	0.3	U
4-Methyl-2-pentanone	0.4	U	0.4	U
2-Hexanone	0.5	U	0.5	U
2-Chloroethylvinylether	0.2	U	0.2	U

*= Outside of EPA CLP QC limits.

Roy F. Weston, Inc. - Gulf Coast Laboratories
VOLATILES BY GC/MS, METHOD 524 LIST

RFW Batch Number: 9109G723 | Client: Ekco Houseware | Work Order: 2994-02-03-0000 | Report Date: 10/11/91 11:25 | Page: 1a

	Cust ID:	I-13-GW	R-4-GW	I-4-GW	I-4-GW	VBLK	VBLK BS
Sample Information	RFW#:	001	002	003	003 DL	91GVE239-MB1	91GVE239-MB1
	Matrix:	WATER	WATER	WATER	WATER	WATER	WATER
	D.F.:	1.00	1.00	1.00	5.00	1.00	1.00
	Units:	UG/L	UG/L	UG/L	UG/L	UG/L	UG/L

Bromofluorobenzene	114 % fl	116 % fl	116 % fl	117 % fl	116 % fl	121 % fl
Dichlorodifluoromethane	0.3 U	0.3 U	0.3 U	NA	0.3 U	0.3 U
Chloromethane	0.2 U	0.2 U	0.2 U	NA	0.2 U	0.2 U
Bromomethane	0.1 U	0.1 U	0.1 U	NA	0.1 U	0.1 U
Vinyl Chloride	4	2	0.2 U	NA	0.2 U	0.2 U
Chloroethane	0.1 U	0.1 U	0.1 U	NA	0.1 U	0.1 U
Methylene Chloride	1 B	2 B	2 BU	NA	2	2 B
Trichlorofluoromethane	0.1 U	0.1 U	0.1 U	NA	0.1 U	0.1 U
1,1-Dichloroethene	0.1 U	0.1 U	0.1 U	NA	0.1 U	94 %
1,1-Dichloroethane	0.1 U	2	E	164	0.1 U	0.1 U
cis-1,2-Dichloroethene	0.2 U	0.2 U	0.2 U	NA	0.2 U	0.2 U
2,2-Dichloropropane	0.1 U	0.1 U	0.1 U	NA	0.1 U	0.1 U
trans-1,2-Dichloroethene	0.1 U	0.1 U	0.1 U	NA	0.1 U	0.1 U
Chloroform	0.2 U	0.2 U	0.2 U	NA	0.2 U	0.2 U
Bromochloromethane	0.2 U	0.2 U	0.2 U	NA	0.2 U	0.2 U
1,2-Dichloroethane	0.2 U	0.2 U	0.2 U	NA	0.2 U	0.2 U
1,1,1-Trichloroethane	0.2 U	0.2 U	0.2 U	NA	0.2 U	0.2 U
Carbon Tetrachloride	0.1 U	0.1 U	0.1 U	NA	0.1 U	0.1 U
1,1-Dichloropropene	0.1 U	0.1 U	0.1 U	NA	0.1 U	0.1 U
Bromodichloromethane	0.2 U	0.2 U	0.2 U	NA	0.2 U	0.2 U
Dibromomethane	0.2 U	0.2 U	0.2 U	NA	0.2 U	0.2 U
1,2-Dichloropropane	0.2 U	0.2 U	0.2 U	NA	0.2 U	0.2 U
Trichloroethene	0.3 U	2	0.3 U	NA	0.3 U	93 %
Dibromochloromethane	0.2 U	0.2 U	0.2 U	NA	0.2 U	0.2 U
1,2-Dibromoethane	0.2 U	0.2 U	0.2 U	NA	0.2 U	0.2 U
1,1,2-Trichloroethane	0.3 U	0.3 U	0.3 U	NA	0.3 U	0.3 U
Benzene	0.2 U	0.2 U	0.2 U	NA	0.2 U	100 %
1,3-Dichloropropane	0.2 U	0.2 U	0.2 U	NA	0.2 U	0.2 U
Bromoform	0.2 U	0.2 U	0.2 U	NA	0.2 U	0.2 U
Tetrachloroethene	0.1 U	0.1 U	0.1 U	NA	0.1 U	0.1 U
1,1,2,2-Tetrachloroethane	0.2 U	0.2 U	0.2 U	NA	0.2 U	0.2 U
Toluene	0.9	0.1 U	0.1 U	NA	0.1 U	96 %

*= Outside of EPA CLP QC limits.

RFW Batch Number: 9109G723 Client: Ekco Houseware Work Order: 2994-02-03-0000 Page: 1b

Cust ID:	I-13-GW	R-4-GW	I-4-GW	I-4-GW	VBLK	VBLK BS
RFW#:	001	002	003	003 DL	91GVE239-MB1	91GVE239-MB1
Chlorobenzene	0.1 U	0.1 U	0.1 U	NA	0.1 U	101 %
1,1,1,2-Tetrachlorethane	0.2 U	0.2 U	0.2 U	NA	0.2 U	0.2 U
Ethylbenzene	0.1 U	0.1 U	0.1 U	NA	0.1 U	0.1 U
Styrene	0.2 U	0.2 U	0.2 U	NA	0.2 U	0.2 U
p-Xylene	0.2 U	0.2 U	0.2 U	NA	0.2 U	0.2 U
m-Xylene	0.2 U	0.2 U	0.2 U	NA	0.2 U	0.2 U
o-Xylene	0.3 U	0.3 U	0.3 U	NA	0.3 U	0.3 U
Bromobenzene	0.1 U	0.1 U	0.1 U	NA	0.1 U	0.1 U
1,2,3-Trichloropropane	0.4 U	0.4 U	0.4 U	NA	0.4 U	0.4 U
Isopropylbenzene	0.2 U	0.2 U	0.2 U	NA	0.2 U	0.2 U
n-Propylbenzene	0.2 U	0.2 U	0.2 U	NA	0.2 U	0.2 U
2-Chlorotoluene	0.2 U	0.2 U	0.2 U	NA	0.2 U	0.2 U
4-Chlorotoluene	0.2 U	0.2 U	0.2 U	NA	0.2 U	0.2 U
1,3,5-Trimethylbenzene	0.1 U	0.1 U	0.1 U	NA	0.1 U	0.1 U
tert-Butylbenzene	0.2 U	0.2 U	0.2 U	NA	0.2 U	0.2 U
1,2,4-Trimethylbenzene	0.3 U	0.3 U	0.3 U	NA	0.3 U	0.3 U
sec-Butylbenzene	0.2 U	0.2 U	0.2 U	NA	0.2 U	0.2 U
p-Isopropyltoluene	0.2 U	0.2 U	0.2 U	NA	0.2 U	0.2 U
1,3-Dichlorobenzene	0.1 U	0.1 U	0.1 U	NA	0.1 U	0.1 U
1,4-Dichlorobenzene	0.3 U	0.3 U	0.3 U	NA	0.3 U	0.3 U
1,2-Dichlorobenzene	0.1 U	0.1 U	0.1 U	NA	0.1 U	0.1 U
n-Butylbenzene	0.1 U	0.1 U	0.1 U	NA	0.1 U	0.1 U
1,2-Dibromo-3-Chloropropane	0.5 U	0.5 U	0.5 U	NA	0.5 U	0.5 U
1,2,4-Trichlorobenzene	0.2 U	0.2 U	0.2 U	NA	0.2 U	0.2 U
Hexachlorobutadiene	0.4 U	0.4 U	0.4 U	NA	0.4 U	0.4 U
Naphthalene	0.2 U	0.2 U	0.2 U	NA	0.2 U	0.2 U
1,2,3-Trichlorobenzene	0.1 U	0.1 U	0.1 U	NA	0.1 U	0.1 U
cis-1,3-Dichloropropene	0.1 U	0.1 U	0.1 U	NA	0.1 U	0.1 U
trans-1,3-Dichloropropene	0.3 U	0.3 U	0.3 U	NA	0.3 U	0.3 U
Acetone	2 U	2 U	2 U	NA	2 U	2 U
Carbon Disulfide	0.1 U	0.1 U	0.1 U	NA	0.1 U	0.1 U
2-Butanone	0.3 U	0.3 U	0.3 U	NA	0.3 U	0.3 U
Vinyl Acetate	0.3 U	0.3 U	0.3 U	NA	0.3 U	0.3 U
4-Methyl-2-pentanone	0.4 U	0.4 U	0.4 U	NA	0.4 U	0.4 U
2-Hexanone	0.5 U	0.5 U	0.5 U	NA	0.5 U	0.5 U
2-Chloroethylvinylether	0.2 U	0.2 U	0.2 U	NA	0.2 U	0.2 U

*= Outside of EPA CLP QC limits.

Roy F. Weston, Inc. - Gulf Coast Laboratories
VOLATILES BY GC/MS, HSL LIST

RFW Batch Number: 92026419 | Client: Ekco Houseware | Report Date: 02/25/92 14:49 | Work Order: 2994-02-02-0000 | Page: 5a

Cust ID: VBLK BS

Sample Information
RFW#: 92GVE024-MB1
Matrix: WATER
D.F.: 1.00
Units: ug/L

Surrogate Recovery	Toluene-d8	100	%
	Bromofluorobenzene	105	%
	1,2-Dichloroethane-d4	102	%
Chloromethane		2	U
Bromomethane		2	U
Vinyl Chloride		1	U
Chloroethane		2	U
Methylene Chloride		1	U
Acetone		6	
Carbon Disulfide		1	U
1,1-Dichloroethene		107	%
1,1-Dichloroethane		1	U
1,2-Dichloroethene (total)		1	U
Chloroform		1	U
1,2-Dichloroethane		1	U
2-Butanone		2	U
1,1,1-Trichloroethane		1	U
Carbon Tetrachloride		1	U
Vinyl Acetate		2	U
Bromodichloromethane		1	U
1,2-Dichloropropane		1	U
cis-1,3-Dichloropropene		1	U
Trichloroethene		91	%
Dibromochloromethane		1	U
1,1,2-Trichloroethane		1	U
Benzene		69 *	%
Trans-1,3-Dichloropropene		1	U
Bromoform		1	U
4-Methyl-2-pentanone		2	U
2-Hexanone		2	U
Tetrachloroethene		1	U
1,1,2,2-Tetrachloroethane		1	U

*= Outside of EPA CLP QC limits.

[redacted] Work Order: [redacted] Page: 30

Cust ID: VBLK BS

RFW#: 92GVE024-MB1

Toluene	79	%
Chlorobenzene	95	%
Ethylbenzene	1	U
Styrene	1	U
Xylene (total)	1	U

*= Outside of EPA CLP QC limits.

Roy F. Weston, Inc. - Gulf Coast Laboratories
VOLATILES BY GC/MS, HSL LIST

RFW Batch Number: 92026419 Client: Ekco Housewares Work Order: 2994-02-02-0000 Report Date: 02/25/92 14:49 Page: 4a

	Cust ID:	R-5	VBLK	VBLK BS	VBLK	VBLK BS	VBLK
Sample Information	RFW#:	010	92GVE023-MB1	92GVE023-MB1	92GVC040-MB1	92GVC040-MB1	92GVE024-MB1
	Matrix:	WATER	WATER	WATER	WATER	WATER	WATER
	D.F.:	1.00	1.00	1.00	1.00	1.00	1.00
	Units:	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
Surrogate Recovery	Toluene-d8	104 %	97 %	101 %	100 %	99 %	103 %
	Bromofluorobenzene	108 %	98 %	104 %	102 %	107 %	104 %
	1,2-Dichloroethane-d4	109 %	97 %	108 %	101 %	116 * %	94 %
		fl	fl	fl	fl	fl	fl
Chloromethane		2 U	2 U	2 U	2 U	2 U	2 U
Bromomethane		2 U	2 U	2 U	2 U	2 U	2 U
Vinyl Chloride		9	1 U	1 U	1 U	1 U	1 U
Chloroethane		2 U	2 U	2 U	2 U	2 U	2 U
Methylene Chloride		2	1 U	1 U	2	2 B	1 U
Acetone		2 U	2 U	2 U	2	5 B	2 U
Carbon Disulfide		1 U	1 U	1 U	1 U	1 U	1 U
1,1-Dichloroethene		1 U	1 U	114 %	1 U	132 %	1 U
1,1-Dichloroethane		1	1 U	1 U	1 U	1 U	1 U
1,2-Dichloroethene (total)		12	1 U	1 U	1 U	1 U	1 U
Chloroform		1 U	1 U	1 U	1 U	1 U	1 U
1,2-Dichloroethane		1 U	1 U	1 U	1 U	1 U	1 U
2-Butanone		2 U	2 U	2 U	2 U	2 U	2 U
1,1,1-Trichloroethane		1 U	1 U	1 U	1 U	1 U	1 U
Carbon Tetrachloride		1 U	1 U	1 U	1 U	1 U	1 U
Vinyl Acetate		2 U	2 U	2 U	2 U	2 U	2 U
Bromodichloromethane		1 U	1 U	1 U	1 U	1 U	1 U
1,2-Dichloropropane		1 U	1 U	1 U	1 U	1 U	1 U
cis-1,3-Dichloropropene		1 U	1 U	1 U	1 U	1 U	1 U
Trichloroethene		6	1 U	97 %	1 U	98 %	1 U
Dibromochloromethane		1 U	1 U	1 U	1 U	1 U	1 U
1,1,2-Trichloroethane		1 U	1 U	1 U	1 U	1 U	1 U
Benzene		1 U	1 U	80 %	1 U	90 %	1 U
Trans-1,3-Dichloropropene		1 U	1 U	1 U	1 U	1 U	1 U
Bromoform		1 U	1 U	1 U	1 U	1 U	1 U
4-Methyl-2-pentanone		2 U	2 U	2 U	2 U	2 U	2 U
2-Hexanone		2 U	2 U	2 U	2 U	2 U	2 U
Tetrachloroethene		1 U	1 U	1 U	1 U	1 U	1 U
1,1,2,2-Tetrachloroethane		1 U	1 U	1 U	1 U	1 U	1 U

*= Outside of EPA CLP QC limits.

[redacted] Project 40

Cust ID:	R-5	VBLK	VBLK BS	VBLK	VBLK BS	VBLK
RFW#:	010	92GVE023-MB1	92GVE023-MB1	92GVC040-MB1	92GVC040-MB1	92GVE024-MB1
Toluene	1 U	1 U	85 %	1 U	88 %	1 U
Chlorobenzene	1 U	1 U	96 %	1 U	100 %	1 U
Ethylbenzene	1 U	1 U	1 U	1 U	1 U	1 U
Styrene	1 U	1 U	1 U	1 U	1 U	1 U
Xylene (total)	1 U	1 U	1 U	1 U	1 U	1 U

*= Outside of EPA CLP QC limits.

SENT BY:E530 ; 7-11-94 ; 11:42 ; WESTON-REA F. WESTON, INC. ; 13

Roy F. Weston, Inc. - Gulf Coast Laboratories
VOLATILES BY GC/MS, HSL LIST

RFW Batch Number: 92026419 Client: Ekco Houseware Work Order: 2994-02-02-0000 Report Date: 02/25/92 14:49 Page: 3a

	Cust ID:	L-3	L-4	L-4	L-4	L-4	L-5
Sample Information	RFW#:	007	008	008 DL	008 MS	008 MSD	009
	Matrix:	WATER	WATER	WATER	WATER	WATER	WATER
	D.F.:	1.00	1.00	5.00	1.00	1.00	1.00
	Units:	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
Surrogate Recovery	Toluene-d8	101 %	101 %	98 %	100 %	101 %	101 %
	Bromofluorobenzene	104 %	107 %	108 %	106 %	107 %	106 %
	1,2-Dichloroethane-d4	97 %	126 * %	100 %	125 * %	127 * %	118 * %
Chloromethane		2 U	2 U	NA	2 U	2 U	2 U
Bromomethane		2 U	2 U	NA	2 U	2 U	2 U
Vinyl Chloride		1 U	1 U	NA	1 U	1 U	37
Chloroethane		2 U	2 U	NA	2 U	2 U	2 U
Methylene Chloride		2 U	4 B U	NA	5 B	4 B	3 B U
Acetone		2 U	2 U	NA	2 U	7 B	2 U
Carbon Disulfide		1 U	1 U	NA	1 U	1 U	1 U
1,1-Dichloroethene		1 U	2	NA	113 %	120 %	1 U
1,1-Dichloroethane		1 U	21	NA	21	21	10
1,2-Dichloroethene (total)		1 U	E	20	E	E	18
Chloroform		1 U	1 U	NA	1 U	1 U	1 U
1,2-Dichloroethane		1 U	1 U	NA	1 U	1 U	1 U
2-Butanone		2 U	2 U	NA	2 U	2 U	2 U
1,1,1-Trichloroethane		1 U	1 U	NA	1 U	1 U	1 U
Carbon Tetrachloride		1 U	1 U	NA	1 U	1 U	1 U
Vinyl Acetate		2 U	2 U	NA	2 U	2 U	2 U
Bromodichloromethane		1 U	1 U	NA	1 U	1 U	1 U
1,2-Dichloropropane		1 U	1 U	NA	1 U	1 U	1 U
cis-1,3-Dichloropropene		1 U	1 U	NA	1 U	1 U	1 U
Trichloroethene		1 U	1 U	NA	101 %	102 %	1 U
Dibromochloromethane		1 U	1 U	NA	1 U	1 U	1 U
1,1,2-Trichloroethane		1 U	1 U	NA	1 U	1 U	1 U
Benzene		1 U	1 U	NA	92 %	94 %	1 U
Trans-1,3-Dichloropropene		1 U	1 U	NA	1 U	1 U	1 U
Bromoform		1 U	1 U	NA	1 U	1 U	1 U
4-Methyl-2-pentanone		2 U	2 U	NA	2 U	2 U	2 U
2-Hexanone		2 U	2 U	NA	2 U	2 U	2 U
Tetrachloroethene		1 U	1 U	NA	1 U	1 U	1 U
1,1,2,2-Tetrachloroethane		1 U	1 U	NA	1 U	1 U	1 U

*= Outside of EPA CLP QC limits.

[redacted] Baker Number: 9206[redacted]19 Client: Ekco Housewares Work Order: 0394-07-02-0000 Page: 30

	Cust ID:	L-3	L-4	L-4	L-4	L-4	L-5
	RFW#:	007	008	008 DL	008 MS	008 MSD	009
Toluene		1 U	1 U	NA	88 %	90 %	1 U
Chlorobenzene		1 U	1 U	NA	101 %	103 %	1 U
Ethylbenzene		1 U	1 U	NA	1 U	1 U	1 U
Styrene		1 U	1 U	NA	1 U	1 U	1 U
Xylene (total)		1 U	1 U	NA	1 U	1 U	1 U

*= Outside of EPA CLP QC limits.

Roy F. Weston, Inc. - Gulf Coast Laboratories
VOLATILES BY GC/MS, HSL LIST

RFW Batch Number: 9202G419 Client: Ekco Housewares Work Order: 2994-02-02-0000 Report Date: 02/25/92 14:49 Page: 2a

	Cust ID:	L-1		L-1 Dup		L-1 Dup		L-1 Dup		L-2		L-2	
Sample Information	RFW#:	004 DL		005		005 DL		005 DL		006		006 DL	
	Matrix:	WATER		WATER		WATER		WATER		WATER		WATER	
	D.F.:	40.0		1.00		10.0		50.0		1.00		20.0	
	Units:	ug/L		ug/L		ug/L		ug/L		ug/L		ug/L	
Surrogate Recovery	Toluene-d8	102	%	99	%	100	%	99	%	103	%	99	%
	Bromofluorobenzene	109	%	116 *	%	100	%	107	%	103	%	106	%
	1,2-Dichloroethane-d4	111	%	130 *	%	97	%	97	%	101	%	99	%
	f1				f1		f1		f1		f1		f1
Chloromethane		NA		2	U	NA		NA		2	U	NA	
Bromomethane		NA		2	U	NA		NA		2	U	NA	
Vinyl Chloride		NA		23		NA		NA		1	U	NA	
Chloroethane		NA		2	U	NA		NA		2	U	NA	
Methylene Chloride		NA		3	B U	NA		NA		2	U	NA	
Acetone		NA		2	U	NA		NA		6	U	NA	
Carbon Disulfide		NA		1	U	NA		NA		1	U	NA	
1,1-Dichloroethene		NA		2		NA		NA		1	U	NA	
1,1-Dichloroethane		NA			E	77		NA		2		NA	
1,2-Dichloroethene (total)		NA			E	110		NA		3		NA	
Chloroform		NA		1	U	NA		NA		1	U	NA	
1,2-Dichloroethane		NA		1	U	NA		NA		1	U	NA	
2-Butanone		NA		2	U	NA		NA		2	U	NA	
1,1,1-Trichloroethane		NA		3		NA		NA		5		NA	
Carbon Tetrachloride		NA		1	U	NA		NA		1	U	NA	
Vinyl Acetate		NA		2	U	NA		NA		2	U	NA	
Bromodichloromethane		NA		1	U	NA		NA		1	U	NA	
1,2-Dichloropropane		NA		1	U	NA		NA		1	U	NA	
cis-1,3-Dichloropropene		NA		1	U	NA		NA		1	U	NA	
Trichloroethene		360			E		E	430			E	210	
Dibromochloromethane		NA		1	U	NA		NA		1	U	NA	
1,1,2-Trichloroethane		NA		1	U	NA		NA		1	U	NA	
Benzene		NA		1	U	NA		NA		1	U	NA	
Trans-1,3-Dichloropropene		NA		1	U	NA		NA		1	U	NA	
Bromoform		NA		1	U	NA		NA		1	U	NA	
4-Methyl-2-pentanone		NA		2	U	NA		NA		2	U	NA	
2-Hexanone		NA		2	U	NA		NA		2	U	NA	
Tetrachloroethene		NA		1	U	NA		NA		1	U	NA	
1,1,2,2-Tetrachloroethane		NA		1	U	NA		NA		1	U	NA	

*= Outside of EPA CLP QC limits.

Cust ID:	L-1	L-1 Dup	L-1 Dup	L-1 Dup	L-2	L-2
RFW#:	004 DL	005	005 DL	005 DL	006	006 DL
Toluene	NA	1 U	NA	NA	1 U	NA
Chlorobenzene	NA	1 U	NA	NA	1 U	NA
Ethylbenzene	NA	1 U	NA	NA	1 U	NA
Styrene	NA	1 U	NA	NA	1 U	NA
Xylene (total)	NA	1 U	NA	NA	1 U	NA

*- Outside of EPA CLP QC limits.

WESTON-GULF COAST LABORATORIES, INC.
2417 Bond St., University Park, Illinois 60466
Phones: (312) 534-5200 (219) 385-7077 815) 723-[illegible]

ANALYTICAL REPORT

TO: Roy F. Weston, Incorporated
1 Weston Way
West Chester, PA 19380

ATTN: Ms. Sherrerd Steele

DATE: January 5, 1989

RE: Grdwater L-1-GW-001
American Home Products
W.O.# 2994-02-03
Sample Date: 11/17/88
Date Received: 11/18/88
GCL#: 144693

VOLATILE COMPOUNDS	RESULT	DETECTION LIMIT		
1,2-Dichloropropane	BDL	5	ug/l	U
Cis-1,3-Dichloropropene	BDL	5	ug/l	U
Trichloroethene	[illegible]10	5	ug/l	e
Dibromochloromethane	BDL	5	ug/l	U
1,1,2-Trichloroethane	BDL	5	ug/l	U
Benzene	BDL	5	ug/l	U
Trans-1,3-Dichloropropene	BDL	5	ug/l	U
Bromoform	BDL	5	ug/l	U
4-Methyl-2-Pentanone	BDL	10	ug/l	U
2-Hexanone	BDL	10	ug/l	U
Tetrachloroethene	BDL	5	ug/l	U
1,1,2,2-Tetrachloroethane	BDL	5	ug/l	U
Toluene	BDL	5	ug/l	U
Chlorobenzene	BDL	5	ug/l	U
Ethylbenzene	BDL	5	ug/l	U
Styrene	BDL	5	ug/l	U
Xylene	BDL	5	ug/l	U

WESTON-GULF COAST LABORATORIES, INC
24[illegible] Bond St., University Park, Illinois 60466
Phones: (312) 534-5200 (219) 885-7977 [illegible]

FINAL TOTAL REPORT

TO: Roy F. Weston, Incorporated
1 Weston Way
West Chester, PA 19380

ATTN: Ms. Sherrerd Steele

DATE: January 5, 1989

RE: Grdwater L-1-GW-001
American Home Products
W.O.# 2994-02-03
Sample Date: 11/17/88
Date Received: 11/18/88
GCL#: 144693

VOLATILE COMPOUNDS	RESULT	DETECTION LIMIT		
Chloromethane	BDL	10	ug/l	U
Bromomethane	BDL	10	ug/l	U
Vinyl Chloride	48	10	ug/l	
Chloroethane	BDL	10	ug/l	U
Methylene Chloride	30	5	ug/l	B
Acetone	11	10	ug/l	B
Carbon Disulfide	BDL	5	ug/l	U
1,1-Dichloroethene	3	5	ug/l	J
1,1-Dichloroethane	87	5	ug/l	
1,2-Dichloroethene (total)	61	5	ug/l	
Chloroform	BDL	5	ug/l	U
1,2-Dichloroethane	BDL	5	ug/l	U
2-Butanone	BDL	10	ug/l	U
1,1,1-Trichloroethane	49	5	ug/l	
Carbon Tetrachloride	BDL	5	ug/l	U
Vinyl Acetate	BDL	10	ug/l	U
Bromodichloromethane	BDL	5	ug/l	U

WESTON-GULF COAST LABORATORIES, INC.
2417 Bond St., University Park, Illinois 60466
Phones: 312) 534-5200 219) 385-7077 813) 725-7533

ANALYTICAL REPORT

TO: Roy F. Weston, Incorporated
1 Weston Way
West Chester, PA 19380

ATTN: Ms. Sherrerd Steele

DATE: January 6, 1989

RE: Grdwater I-5-GW-001
American Home Products
W.O.# 2994-02-03
Sample Date: 11/17/88
Date Received: 11/18/88
GCL#: 144692

VOLATILE COMPOUNDS	RESULT	DETECTION LIMIT		
2-Chloroethyl vinyl ether	BDL	10	ug/l	U
1,3-Dichlorobenzene	BDL	10	ug/l	U
1,2-Dichlorobenzene	BDL	10	ug/l	U
1,4-Dichlorobenzene	BDL	10	ug/l	U

WESTON-GULF COAST LABORATORIES INC
24[illegible] Bond St., University Park, Illinois 60466
Phones: (312) 534-5200 (219) 385-[illegible] (815) 723-[illegible]

ANALYTICAL REPORT

TO: Roy F. Weston, Incorporated
1 Weston Way
West Chester, PA 19380

ATTN: Ms. Sherrerd Steele

DATE: January 5, 1989

RE: Grdwater I-5-GW-001
American Home Products
W.O.# 2994-02-03
Sample Date: 11/17/88
Date Received: 11/18/88
GCL#: 144692

VOLATILE COMPOUNDS	RESULT	DETECTION LIMIT		
1,2-Dichloropropane	BDL	5	ug/l	U
Cis-1,3-Dichloropropene	BDL	5	ug/l	U
Trichloroethene	240	5	ug/l	e
Dibromochloromethane	BDL	5	ug/l	U
1,1,2-Trichloroethane	BDL	5	ug/l	U
Benzene	4	5	ug/l	J
Trans-1,3-Dichloropropene	BDL	5	ug/l	U
Bromoform	BDL	5	ug/l	U
4-Methyl-2-Pentanone	BDL	10	ug/l	U
2-Hexanone	BDL	10	ug/l	U
Tetrachloroethene	BDL	5	ug/l	U
1,1,2,2-Tetrachloroethane	BDL	5	ug/l	U
Toluene	BDL	5	ug/l	U
Chlorobenzene	BDL	5	ug/l	U
Ethylbenzene	BDL	5	ug/l	U
Styrene	BDL	5	ug/l	U
Xylene	BDL	5	ug/l	U

WESTON-GULF COAST LABORATORIES, INC
24[illegible] Bond St., University Park, Illinois 60466
Phones: 3[illegible] 534-5200 (2[illegible] 385-707[illegible] (8[illegible] 720-7[illegible]

ANALYTICAL REPORT

TO: Roy F. Weston, Incorporated
1 Weston Way
West Chester, PA 19380

ATTN: Ms. Sherrerd Steele

DATE: January 5, 1989

RE: Grdwater I-5-GW-001
American Home Products
W.O.# 2994-02-03
Sample Date: 11/17/88
Date Received: 11/18/88
GCL#: 144692

VOLATILE COMPOUNDS	RESULT	DETECTION LIMIT		
Chloromethane	BDL	10	ug/l	U
Bromomethane	BDL	10	ug/l	U
Vinyl Chloride	BDL	10	ug/l	U
Chloroethane	BDL	10	ug/l	U
Methylene Chloride	31	5	ug/l	B
Acetone	26	10	ug/l	B
Carbon Disulfide	BDL	5	ug/l	U
1,1-Dichloroethene	5	5	ug/l	
1,1-Dichloroethane	[illegible]86	5	ug/l	
1,2-Dichloroethene (total)	BDL	5	ug/l	U
Chloroform	BDL	5	ug/l	U
1,2-Dichloroethane	BDL	5	ug/l	U
2-Butanone	BDL	10	ug/l	U
1,1,1-Trichloroethane	[illegible]40	5	ug/l	
Carbon Tetrachloride	BDL	5	ug/l	U
Vinyl Acetate	BDL	10	ug/l	U
Bromodichloromethane	BDL	5	ug/l	U

WESTON-GULF COAST LABORATORIES INC
24[illegible] Bond St., University Park, Illinois 60466
Phones: (312) 534-5200 (219) 465-[illegible]

ANALYTICAL REPORT

TO: Roy F. Weston, Incorporated
1 Weston Way
West Chester, PA 19380

ATTN: Ms. Sherrerd Steele

DATE: January 6, 1989

RE: Grdwater I-2-GW-001
American Home Products
W.O.# 2994-02-03
Sample Date: 11/17/88
Date Received: 11/18/88
GCL#: 144691DL

VOLATILE COMPOUNDS	RESULT	DETECTION LIMIT		
1,2-Dichloroethene (total)	[illegible]60	50	ug/l	D
Trichloroethene	[illegible]10	50	ug/l	D

WESTON-GULF COAST LABORATORIES, INC.
2417 Bond St., University Park, Illinois 60466
Phones: (312) 534-5200 (219) 885-7077 (815) 723-7551

ANALYTICAL REPORT

TO: Roy F. Weston, Incorporated
1 Weston Way
West Chester, PA 19380

ATTN: Ms. Sherrerd Steele

DATE: January 6, 1989

RE: Grdwater I-2-GW-001
American Home Products
W.O.# 2994-02-03
Sample Date: 11/17/88
Date Received: 11/18/88
GCL#: 144691

VOLATILE COMPOUNDS	RESULT	DETECTION LIMIT
2-Chloroethyl vinyl ether	BDL	10 ug/l U
1,3-Dichlorobenzene	BDL	10 ug/l U
1,2-Dichlorobenzene	BDL	10 ug/l U
1,4-Dichlorobenzene	BDL	10 ug/l U

WESTON-GULF COAST LABORATORIES, INC.
2417 Bond St., University Park, Illinois 60466
Phones: (312) 534-5200 (219) 885-7077 (815) 723-7533

ANALYTICAL REPORT

TO: Roy F. Weston, Incorporated
1 Weston Way
West Chester, PA 19380

ATTN: Ms. Sherrerd Steele

DATE: January 6, 1989

RE: Grdwater I-2-GW-001
American Home Products
W.O.# 2994-02-03
Sample Date: 11/17/88
Date Received: 11/18/88
GCL#: 144691

VOLATILE COMPOUNDS	RESULT	DETECTION LIMIT		
1,2-Dichloropropane	BDL	5	ug/l	U
Cis-1,3-Dichloropropene	BDL	5	ug/l	U
Trichloroethene	680	5	ug/l	(e)
Dibromochloromethane	BDL	5	ug/l	U
1,1,2-Trichloroethane	BDL	5	ug/l	U
Benzene	BDL	5	ug/l	U
Trans-1,3-Dichloropropene	BDL	5	ug/l	U
Bromoform	BDL	5	ug/l	U
4-Methyl-2-Pentanone	BDL	10	ug/l	U
2-Hexanone	BDL	10	ug/l	U
Tetrachloroethene	BDL	5	ug/l	U
1,1,2,2-Tetrachloroethane	BDL	5	ug/l	U
Toluene	BDL	5	ug/l	U
Chlorobenzene	BDL	5	ug/l	U
Ethylbenzene	BDL	5	ug/l	U
Styrene	BDL	5	ug/l	U
Xylene	BDL	5	ug/l	U

WESTON-GULF COAST LABORATORIES INC.
2417 Bond St., University Park, Illinois 60466
Phones: 312) 534-5200 (312) 885-7077 815) 723-7531

ANALYTICAL REPORT

TO: Roy F. Weston, Incorporated
1 Weston Way
West Chester, PA 19380

ATTN: Ms. Sherrerd Steele

DATE: January 6, 1989

RE: Grdwater I-2-GW-001
American Home Products
W.O.# 2994-02-03
Sample Date: 11/17/88
Date Received: 11/18/88
GCL#: 144691

VOLATILE COMPOUNDS	RESULT	DETECTION LIMIT		
Chloromethane	BDL	10	ug/l	U
Bromomethane	BDL	10	ug/l	U
Vinyl Chloride	56	10	ug/l	
Chloroethane	BDL	10	ug/l	U
Methylene Chloride	34	5	ug/l	(B)
Acetone	34	10	ug/l	(B)
Carbon Disulfide	BDL	5	ug/l	U
1,1-Dichloroethene	22	5	ug/l	
1,1-Dichloroethane	60	5	ug/l	
1,2-Dichloroethene (total)	300	5	ug/l	(e)
Chloroform	BDL	5	ug/l	U
1,2-Dichloroethane	BDL	5	ug/l	U
2-Butanone	BDL	10	ug/l	U
1,1,1-Trichloroethane	57	5	ug/l	
Carbon Tetrachloride	BDL	5	ug/l	U
Vinyl Acetate	BDL	10	ug/l	U
Bromodichloromethane	BDL	5	ug/l	U

WESTON-GULF COAST LABORATORIES INC
[illegible] Bond St. University Park, Illinois 60466
Phones [illegible]

TO: Roy F. Weston, Incorporated
1 Weston Way
West Chester, PA 19380

ATTN: Ms. Sherrerd Steele

DATE: January 6, 1989

RE: Grdwater D-4-30-GW-001
American Home Products
W.O.# 2994-02-03
Sample Date: 11/17/88
Date Received: 11/18/88
GCL#: 144690DL

VOLATILE COMPOUNDS	RESULT	DETECTION LIMIT		
1,1,1-Trichloroethane	52000	10000	ug/l	D
Trichloroethene	220000	10000	ug/l	D

WESTON-GULF COAST LABORATORIES INC
[illegible] Bond St University Park Illinois 60466
Phones: [illegible]

TO: Roy F. Weston, Incorporated
1 Weston Way
West Chester, PA 19380

ATTN: Ms. Sherrerd Steele

DATE: January 6, 1989

RE: Grdwater D-4-30-GW-001
American Home Products
W.O.# 2994-02-03
Sample Date: 11/17/88
Date Received: 11/18/88
GCL#: 144690

VOLATILE COMPOUNDS	RESULT	DETECTION LIMIT		
2-Chloroethyl vinyl ether	BDL	10	ug/l	U
1,3-Dichlorobenzene	BDL	10	ug/l	U
1,2-Dichlorobenzene	BDL	10	ug/l	U
1,4-Dichlorobenzene	BDL	10	ug/l	U

WESTON-GULF COAST LABORATORIES INC
[illegible] Bond St. University Park, Illinois 60466
Phones [illegible]

TO: Roy F. Weston, Incorporated
1 Weston Way
West Chester, PA 19380

ATTN: Ms. Sherrerd Steele

DATE: January 6, 1989

RE: Grdwater D-4-30-GW-001
American Home Products
W.O.# 2994-02-03
Sample Date: 11/17/88
Date Received: 11/18/88
GCL#: 144690

VOLATILE COMPOUNDS	RESULT	DETECTION LIMIT		
1,2-Dichloropropane	BDL	5	ug/l	U
Cis-1,3-Dichloropropene	BDL	5	ug/l	U
Trichloroethene	1900	5	ug/l	(e)
Dibromochloromethane	BDL	5	ug/l	U
1,1,2-Trichloroethane	[illegible]40	5	ug/l	
Benzene	BDL	5	ug/l	U
Trans-1,3-Dichloropropene	BDL	5	ug/l	U
Bromoform	BDL	5	ug/l	U
4-Methyl-2-Pentanone	[illegible]	10	ug/l	J
2-Hexanone	BDL	10	ug/l	U
Tetrachloroethene	55	5	ug/l	
1,1,2,2-Tetrachloroethane	BDL	5	ug/l	U
Toluene	130	5	ug/l	
Chlorobenzene	BDL	5	ug/l	U
Ethylbenzene	3	5	ug/l	J
Styrene	BDL	5	ug/l	U
Xylene (total)	[illegible]	5	ug/l	

WESTON-GULF COAST LABORATORIES INC
2417 Bond St., University Park, Illinois 60466
Phones: [illegible]

TO: Roy F. Weston, Incorporated
1 Weston Way
West Chester, PA 19380

ATTN: Ms. Sherrerd Steele

DATE: January 6, 1989

RE: Grdwater D-4-30-GW-001
American Home Products
W.O.# 2994-02-03
Sample Date: 11/17/88
Date Received: 11/18/88
GCL#: 144690

VOLATILE COMPOUNDS	RESULT	DETECTION LIMIT		
Chloromethane	BDL	10	ug/l	U
Bromomethane	BDL	10	ug/l	U
Vinyl Chloride	[illegible]	10	ug/l	J
Chloroethane	BDL	10	ug/l	U
Methylene Chloride	69	5	ug/l	B
Acetone	82	10	ug/l	B
Carbon Disulfide	BDL	5	ug/l	U
1,1-Dichloroethene	1900	5	ug/l	e
1,1-Dichloroethane	1900	5	ug/l	e
1,2-Dichloroethene (total)	270	5	ug/l	e
Chloroform	10	5	ug/l	
1,2-Dichloroethane	73	5	ug/l	
2-Butanone	BDL	10	ug/l	U
1,1,1-Trichloroethane	3000	5	ug/l	e
Carbon Tetrachloride	BDL	5	ug/l	U
Vinyl Acetate	BDL	10	ug/l	U
Bromodichloromethane	BDL	5	ug/l	U

WESTON-GULF COAST LABORATORIES INC
2417 Bond Street University Park Illinois 60466
Phones: (312) 534-5200 (219) 885-7077 (815) 723-7511

ANALYTICAL REPORT

TO: Roy F. Weston, Inc.
1 Weston Way
West Chester, PA 19380

ATTN: Ms. Sherrerd Steele

DATE: January 4, 1989

RE: Ground Water L-5-GW-001
American Home Products
W.O.# 2994-02-03
Sample Date: 11/16/88
Date Received: 11/17/88
GCL#: 144615

VOLATILE COMPOUNDS	RESULT	DETECTION LIMIT		
2-Chloroethyl vinyl ether	BDL	10	ug/l	U
1,3-Dichlorobenzene	BDL	10	ug/l	U
1,2-Dichlorobenzene	BDL	10	ug/l	U
1,4-Dichlorobenzene	BDL	10	ug/l	U

WESTON-GULF COAST LABORATORIES INC
Phones: (312) 534-5200 (219) 885-7077 (815) 723-7[illegible]

ANALYTICAL REPORT

TO: Roy F. Weston, Inc.
1 Weston Way
West Chester, PA 19380

ATTN: Ms. Sherrerd Steele

DATE: January 4, 1989

RE: Ground Water L-5-GW-001
American Home Products
W.O.# 2994-02-03
Sample Date: 11/16/88
Date Received: 11/17/88
GCL#: 144615

VOLATILE COMPOUNDS	RESULT	DETECTION LIMIT
1,2-Dichloropropane	BDL	5 ug/l U
Cis-1,3-Dichloropropene	BDL	5 ug/l U
Trichloroethene	BDL	5 ug/l U
Dibromochloromethane	BDL	5 ug/l U
1,1,2-Trichloroethane	BDL	5 ug/l U
Benzene	BDL	5 ug/l U
Trans-1,3-Dichloropropene	BDL	5 ug/l U
Bromoform	BDL	5 ug/l U
4-Methyl-2-Pentanone	BDL	10 ug/l U
2-Hexanone	BDL	10 ug/l U
Tetrachloroethene	BDL	5 ug/l U
1,1,2,2-Tetrachloroethane	BDL	5 ug/l U
Toluene	BDL	5 ug/l U
Chlorobenzene	BDL	5 ug/l U
Ethylbenzene	BDL	5 ug/l U
Styrene	BDL	5 ug/l U
Xylene	BDL	5 ug/l U

WESTON-GULF COAST LABORATORIES INC
2417 Bond Street
Phones: (312) 534-5200 (219) 885-7077 (815) 723-7500

ANALYTICAL REPORT

TO: Roy F. Weston, Inc.
1 Weston Way
West Chester, PA 19380

ATTN: Ms. Sherrerd Steele

DATE: January 4, 1989

RE: Ground Water L-5-GW-001
American Home Products
W.O.# 2994-02-03
Sample Date: 11/16/88
Date Received: 11/17/88
GCL#: 144615

VOLATILE COMPOUNDS	RESULT	DETECTION LIMIT		
Chloromethane	BDL	10	ug/l	U
Bromomethane	BDL	10	ug/l	U
Vinyl Chloride	110	10	ug/l	
Chloroethane	BDL	10	ug/l	U
Methylene Chloride	62	5	ug/l	B
Acetone	74	10	ug/l	B
Carbon Disulfide	BDL	5	ug/l	U
1,1-Dichloroethene	BDL	5	ug/l	U
1,1-Dichloroethane	4	5	ug/l	J
1,2-Dichloroethene (total)	92	5	ug/l	
Chloroform	BDL	5	ug/l	U
1,2-Dichloroethane	BDL	5	ug/l	U
2-Butanone	BDL	10	ug/l	U
1,1,1-Trichloroethane	BDL	5	ug/l	U
Carbon Tetrachloride	BDL	5	ug/l	U
Vinyl Acetate	BDL	10	ug/l	U
Bromodichloromethane	BDL	5	ug/l	U

WESTON
MANAGERS DESIGNERS/CONSULTANTS

WESTON-GULF COAST LABORATORIES, INC
2417 Bond St., University Park, Illinois 60466
Phones: (312) 534-5200 (219) 885-7077 (815) 723-7533

ANALYTICAL REPORT

TO: Roy F. Weston, Inc.
1 Weston Way
West Chester, PA 19380

ATTN: Ms. Sherrerd Steele

DATE: January 6, 1989

RE: Ground Water Sample I-4-GW-001
American Home Products
W.O.# 2994-02-03
Sample Date: 11/16/88
Date Received: 11/17/88
GCL#: 144614

VOLATILE COMPOUNDS	RESULT	DETECTION LIMIT	
2-Chloroethyl vinyl ether	BDL	1.00 ug/l	U
1,3-Dichlorobenzene	BDL	0.08 ug/l	U
1,2-Dichlorobenzene	BDL	0.09 ug/l	U
1,4-Dichlorobenzene	BDL	0.09 ug/l	U

WESTON-GULF COAST LABORATORIES, INC.
2417 Bond St., University Park, Illinois 60466
Phones: (312) 534-5200 (219) 885-7077 (815) 723-75

ANALYTICAL REPORT

TO: Roy F. Weston, Inc.
1 Weston Way
West Chester, PA 19380

ATTN: Ms. Sherrerd Steele

DATE: January 6, 1989

RE: Ground Water Sample I-4-GW-001
American Home Products
W.O.# 2994-02-03
Sample Date: 11/16/88
Date Received: 11/17/88
GCL#: 144614

VOLATILE COMPOUNDS	RESULT	DETECTION LIMIT	
1,2-Dichloropropane	BDL	0.24 ug/l	U
Cis-1,3-Dichloropropene	BDL	0.1 ug/l	U
Trichloroethene	BDL	0.27 ug/l	U
Dibromochloromethane	BDL	0.18 ug/l	U
1,1,2-Trichloroethane	BDL	0.20 ug/l	U
Benzene	BDL	0.07 ug/l	U
Trans-1,3-Dichloropropene	BDL	0.10 ug/l	U
Bromoform	BDL	0.15 ug/l	U
4-Methyl-2-Pentanone	BDL	1.0 ug/l	U
2-Hexanone	BDL	1.0 ug/l	U
Tetrachloroethene	BDL	0.19 ug/l	U
1,1,2,2-Tetrachloroethane	BDL	0.23 ug/l	U
Toluene	0.25	0.30 ug/l	J
Chlorobenzene	BDL	0.18 ug/l	U
Ethylbenzene	BDL	0.19 ug/l	U
Styrene	BDL	0.18 ug/l	U
Xylene	BDL	0.19 ug/l	U

WESTON
MANAGERS DESIGNERS/CONSULTANTS

WESTON-GULF COAST LABORATORIES, INC.
2417 Bond St., University Park, Illinois 60466
Phones: (312) 534-5200 (219) 885-7077 (815) 723-753

ANALYTICAL REPORT

TO: Roy F. Weston, Inc.
1 Weston Way
West Chester, PA 19380

ATTN: Ms. Sherrerd Steele

DATE: January 6, 1989

RE: Ground Water Sample I-4-GW-001
American Home Products
W.O.# 2994-02-03
Sample Date: 11/16/88
Date Received: 11/17/88
GCL#: 144614

VOLATILE COMPOUNDS	RESULT	DETECTION LIMIT	
Chloromethane	BDL	0.41 ug/l	U
Bromomethane	BDL	0.27 ug/l	U
Vinyl Chloride	BDL	0.23 ug/l	U
Chloroethane	BDL	0.14 ug/l	U
Methylene Chloride	1.3	0.5 ug/l	B
Acetone	4.4	1.0 ug/l	
Carbon Disulfide	1.1	0.5 ug/l	
1,1-Dichloroethene	BDL	0.26 ug/l	U
1,1-Dichloroethane	50	0.17 ug/l	
1,2-Dichloroethene (total)	BDL	0.17 ug/l	U
Chloroform	BDL	0.14 ug/l	U
1,2-Dichloroethane	BDL	0.1 ug/l	U
2-Butanone	BDL	1.0 ug/l	U
1,1,1-Trichloroethane	BDL	0.5 ug/l	U
Carbon Tetrachloride	BDL	0.08 ug/l	U
Vinyl Acetate	BDL	1.0 ug/l	U
Bromodichloromethane	BDL	0.52 ug/l	U

WESTON-GULF COAST LABORATORIES, INC
2417 Bond St., University Park, Illinois 60466
Phones: (312) 534-5200 (219) 885-7077 (815) 723-753

ANALYTICAL REPORT

TO: Roy F. Weston, Inc.
1 Weston Way
West Chester, PA 19380

ATTN: Ms. Sherrerd Steele

DATE: January 6, 1989

RE: Ground Water Sample S-7-GW-001
American Home Products
W.O.# 2994-02-03
Sample Date: 11/14/88
Date Received: 11/16/88
GCL#: 144532DL

VOLATILE COMPOUNDS	RESULT	DETECTION LIMIT
1,1-Dichloroethane	*37	5 ug/l D
1,1,1-Trichloroethane	150	5 ug/l D

WESTON-GULF COAST LABORATORIES, INC
2417 Bond St., University Park, Illinois 60466
Phones: (312) 534-5200 (219) 885-7077 (815) 723-7521

ANALYTICAL REPORT

TO: Roy F. Weston, Inc.
1 Weston Way
West Chester, PA 19380

ATTN: Ms. Sherrerd Steele

DATE: January 6, 1989

RE: Ground Water Sample S-7-GW-001
American Home Products
W.O.# 2994-02-03
Sample Date: 11/14/88
Date Received: 11/16/88
GCL#: 144532

VOLATILE COMPOUNDS	RESULT	DETECTION LIMIT	
2-Chloroethyl vinyl ether	BDL	1.00 ug/l	U
1,3-Dichlorobenzene	BDL	0.08 ug/l	U
1,2-Dichlorobenzene	BDL	0.09 ug/l	U
1,4-Dichlorobenzene	BDL	0.09 ug/l	U

WESTON-GULF COAST LABORATORIES, INC
2417 Bond St., University Park, Illinois 60466
Phones: (312) 534-5200 (219) 885-7077 (815) 723-[illegible]

ANALYTICAL REPORT

TO: Roy F. Weston, Inc.
1 Weston Way
West Chester, PA 19380

ATTN: Ms. Sherrerd Steele

DATE: January 6, 1989

RE: Ground Water Sample S-7-GW-001
American Home Products
W.O.# 2994-02-03
Sample Date: 11/14/88
Date Received: 11/16/88
GCL#: 144532

VOLATILE COMPOUNDS	RESULT	DETECTION LIMIT	
1,2-Dichloropropane	BDL	0.24 ug/l	U
Cis-1,3-Dichloropropene	BDL	0.1 ug/l	U
Trichloroethene	16	0.27 ug/l	
Dibromochloromethane	BDL	0.18 ug/l	U
1,1,2-Trichloroethane	BDL	0.20 ug/l	U
Benzene	15	0.07 ug/l	
Trans-1,3-Dichloropropene	BDL	0.10 ug/l	U
Bromoform	BDL	0.15 ug/l	U
4-Methyl-2-Pentanone	BDL	1.0 ug/l	U
2-Hexanone	BDL	1.0 ug/l	U
Tetrachloroethene	BDL	0.19 ug/l	U
1,1,2,2-Tetrachloroethane	BDL	0.23 ug/l	U
Toluene	13	0.30 ug/l	
Chlorobenzene	BDL	0.18 ug/l	U
Ethylbenzene	0.29	0.19 ug/l	
Styrene	BDL	0.18 ug/l	U
Xylene	[illegible]	0.19 ug/l	

WESTON-GULF COAST LABORATORIES INC
2417 Bond St., University Park, Illinois 60466
Phones: (312) 534-5200 (219) 885-7077 (815) 723-753

ANALYTICAL REPORT

TO: Roy F. Weston, Inc.
1 Weston Way
West Chester, PA 19380

ATTN: Ms. Sherrerd Steele

DATE: January 6, 1989

RE: Ground Water Sample S-7-GW-001
American Home Products
W.O.# 2994-02-03
Sample Date: 11/14/88
Date Received: 11/16/88
GCL#: 144532

VOLATILE COMPOUNDS	RESULT	DETECTION LIMIT	
Chloromethane	BDL	0.41 ug/l	U
Bromomethane	BDL	0.27 ug/l	U
Vinyl Chloride	BDL	0.23 ug/l	U
Chloroethane	BDL	0.14 ug/l	U
Methylene Chloride	0.79	0.5 ug/l	B
Acetone	17	1.0 ug/l	
Carbon Disulfide	BDL	0.5 ug/l	U
1,1-Dichloroethene	1.9	0.26 ug/l	
1,1-Dichloroethane	27	0.17 ug/l	e
1,2-Dichloroethene (total)	BDL	0.17 ug/l	U
Chloroform	BDL	0.14 ug/l	U
1,2-Dichloroethane	BDL	0.1 ug/l	U
2-Butanone	BDL	1.0 ug/l	U
1,1,1-Trichloroethane	100	0.5 ug/l	e B
Carbon Tetrachloride	BDL	0.08 ug/l	U
Vinyl Acetate	BDL	1.0 ug/l	U
Bromodichloromethane	BDL	0.52 ug/l	U

WESTON-GULF COAST LABORATORIES INC
2417 Bond St. University Park, Illinois 60466
Phones: (312) 534-5200 (219) 885-7077 (815 [illegible]

ANALYTICAL REPORT

TO: Roy F. Weston, Inc.
1 Weston Way
West Chester, PA 19380

ATTN: Ms. Sherrerd Steele

DATE: January 6, 1989

RE: Ground Water Sample OWS4-GW-001
American Home Products
W.O.# 2994-02-03
Sample Date: 11/15/88
Date Received: 11/16/88
GCL#: 144519

VOLATILE COMPOUNDS	RESULT	DETECTION LIMIT	
2-Chloroethyl vinyl ether	BDL	1.00 ug/l	U
1,3-Dichlorobenzene	BDL	0.08 ug/l	U
1,2-Dichlorobenzene	BDL	0.09 ug/l	U
1,4-Dichlorobenzene	BDL	0.09 ug/l	U

WESTON-GULF COAST LABORATORIES, INC.
2417 Bond St., University Park, Illinois 60466
Phones: (312) 534-5200 (219) 885-7077 (815) 723-7831

ANALYTICAL REPORT

TO: Roy F. Weston, Inc.
1 Weston Way
West Chester, PA 19380

ATTN: Ms. Sherrerd Steele

DATE: January 6, 1989

RE: Ground Water Sample OWS4-GW-001
American Home Products
W.O.# 2994-02-03
Sample Date: 11/15/88
Date Received: 11/16/88
GCL#: 144519

VOLATILE COMPOUNDS	RESULT	DETECTION LIMIT	
1,2-Dichloropropane	BDL	0.24 ug/l	U
Cis-1,3-Dichloropropene	BDL	0.1 ug/l	U
Trichloroethene	0.16	0.27 ug/l	J
Dibromochloromethane	BDL	0.18 ug/l	U
1,1,2-Trichloroethane	BDL	0.20 ug/l	U
Benzene	0.37	0.07 ug/l	
Trans-1,3-Dichloropropene	BDL	0.10 ug/l	U
Bromoform	BDL	0.15 ug/l	U
4-Methyl-2-Pentanone	BDL	1.0 ug/l	U
2-Hexanone	BDL	1.0 ug/l	U
Tetrachloroethene	BDL	0.19 ug/l	U
1,1,2,2-Tetrachloroethane	BDL	0.23 ug/l	U
Toluene	0.80	0.30 ug/l	
Chlorobenzene	BDL	0.18 ug/l	U
Ethylbenzene	0.33	0.19 ug/l	
Styrene	BDL	0.18 ug/l	U
Xylene	0.42	0.19 ug/l	

WESTON
MANAGERS DESIGNERS/CONSULTANTS

WESTON-GULF COAST LABORATORIES, INC
2417 Bond St., University Park, Illinois 60466
Phones: (312) 534-5200 (219) 885-7077 (815) 723-[illegible]

ANALYTICAL REPORT

Off-Site / Do Not Use

TO: Roy F. Weston, Inc.
1 Weston Way
West Chester, PA 19380

ATTN: Ms. Sherrerd Steele

DATE: January 6, 1989

RE: Ground Water Sample OWS4-GW-001
American Home Products
W.O.# 2994-02-03
Sample Date: 11/15/88
Date Received: 11/16/88
GCL#: 144519

VOLATILE COMPOUNDS	RESULT	DETECTION LIMIT	
Chloromethane	BDL	0.41 ug/l	U
Bromomethane	BDL	0.27 ug/l	U
Vinyl Chloride	3.5	0.23 ug/l	
Chloroethane	BDL	0.14 ug/l	U
Methylene Chloride	1.9	0.5 ug/l	B
Acetone	7.1	1.0 ug/l	
Carbon Disulfide	2.8	0.5 ug/l	
1,1-Dichloroethene	BDL	0.26 ug/l	U
1,1-Dichloroethane	BDL	0.17 ug/l	U
1,2-Dichloroethene (total)	BDL	0.17 ug/l	U
Chloroform	BDL	0.14 ug/l	U
1,2-Dichloroethane	BDL	0.1 ug/l	U
2-Butanone	BDL	1.0 ug/l	U
1,1,1-Trichloroethane	0.21	0.5 ug/l	B J
Carbon Tetrachloride	BDL	0.08 ug/l	U
Vinyl Acetate	BDL	1.0 ug/l	U
Bromodichloromethane	BDL	0.52 ug/l	U

WESTON-GULF COAST LABORATORIES, INC.
2417 Bond St., University Park, Illinois 60466
Phones: (312) 534-5200 (219) 885-7077 (815) 723-7533

ANALYTICAL REPORT

TO: Roy F. Weston, Inc.
1 Weston Way
West Chester, PA 19380

ATTN: Ms. Sherrerd Steele

DATE: January 6, 1989

RE: Ground Water Sample I-7-GW-001
American Home Products
W.O.# 2994-02-03
Sample Date: 11/14/88
Date Received: 11/16/88
GCL#: 144516DL

VOLATILE COMPOUNDS	RESULT	DETECTION LIMIT		
1,1-Dichloroethene	160	5	ug/l	D
1,1-Dichloroethane	2200	500	ug/l	D
1,1,1-Trichloroethane	440	500	ug/l	D
Trichloroethene	830	500	ug/l	D

WESTON-GULF COAST LABORATORIES, INC.
2417 Bond St., University Park, Illinois 60466
Phones: (312) 534-5200 (219) 885-7077 (815) 723-7533

ANALYTICAL REPORT

TO: Roy F. Weston, Inc.
1 Weston Way
West Chester, PA 19380

ATTN: Ms. Sherrerd Steele

DATE: January 6, 1989

RE: Ground Water Sample I-7-GW-001
American Home Products
W.O.# 2994-02-03
Sample Date: 11/14/88
Date Received: 11/16/88
GCL#: 144516

VOLATILE COMPOUNDS	RESULT	DETECTION LIMIT	
2-Chloroethyl vinyl ether	BDL	1.00 ug/l	U
1,3-Dichlorobenzene	BDL	0.08 ug/l	U
1,2-Dichlorobenzene	BDL	0.09 ug/l	U
1,4-Dichlorobenzene	BDL	0.09 ug/l	U

WESTON-GULF COAST LABORATORIES, INC.
2[illegible] Bond St., University Park, Illinois 60466
Phones: (312) 534-5200 (219) 885-7077 (815) 723-7533

ANALYTICAL REPORT

TO: Roy F. Weston, Inc.
1 Weston Way
West Chester, PA 19380

ATTN: Ms. Sherrerd Steele

DATE: January 6, 1989

RE: Ground Water Sample I-7-GW-001
American Home Products
W.O.# 2994-02-03
Sample Date: 11/14/88
Date Received: 11/16/88
GCL#: 144516

VOLATILE COMPOUNDS	RESULT	DETECTION LIMIT	
1,2-Dichloropropane	BDL	0.24 ug/l	U
Cis-1,3-Dichloropropene	BDL	0.1 ug/l	U
Trichloroethene	110	0.27 ug/l	(e)
Dibromochloromethane	BDL	0.18 ug/l	U
1,1,2-Trichloroethane	7.4	0.20 ug/l	
Benzene	BDL	0.07 ug/l	U
Trans-1,3-Dichloropropene	BDL	0.10 ug/l	U
Bromoform	BDL	0.15 ug/l	U
4-Methyl-2-Pentanone	BDL	1.0 ug/l	U
2-Hexanone	BDL	1.0 ug/l	U
Tetrachloroethene	0.86	0.19 ug/l	
1,1,2,2-Tetrachloroethane	BDL	0.23 ug/l	U
Toluene	1.9	0.30 ug/l	
Chlorobenzene	BDL	0.18 ug/l	U
Ethylbenzene	0.22	0.19 ug/l	
Styrene	BDL	0.18 ug/l	U
Xylene	BDL	0.19 ug/l	U

WESTON-GULF COAST LABORATORIES, INC.
2417 Bond St. University Park, Illinois 60466
Phones: (312) 534-5200 (219) 885-7077 (815) 722-7[illegible]

ANALYTICAL REPORT

1988 DATA

TO: Roy F. Weston, Inc.
1 Weston Way
West Chester, PA 19380

ATTN: Ms. Sherrerd Steele

DATE: January 6, 1989

RE: Ground Water Sample I-7-GW-001
American Home Products
W.O.# 2994-02-03
Sample Date: 11/14/88
Date Received: 11/16/88
GCL#: 144516

VOLATILE COMPOUNDS	RESULT	DETECTION LIMIT	
Chloromethane	BDL	0.41 ug/l	U
Bromomethane	BDL	0.27 ug/l	U
Vinyl Chloride	5.3	0.23 ug/l	
Chloroethane	6.4	0.14 ug/l	
Methylene Chloride	1.7	0.5 ug/l	B
Acetone	8.1	1.0 ug/l	
Carbon Disulfide	BDL	0.5 ug/l	U
1,1-Dichloroethene	120	0.26 ug/l	e
1,1-Dichloroethane	290	0.17 ug/l	e
1,2-Dichloroethene (total)	16	0.17 ug/l	
Chloroform	BDL	0.14 ug/l	U
1,2-Dichloroethane	3.7	0.1 ug/l	
2-Butanone	2.6	1.0 ug/l	
1,1,1-Trichloroethane	190	0.5 ug/l	e
Carbon Tetrachloride	BDL	0.08 ug/l	U
Vinyl Acetate	BDL	1.0 ug/l	U
Bromodichloromethane	BDL	0.52 ug/l	U

Cust ID:	VBLK	VBLK	VBLK BS
RFW#:	91GVB297-MB1	91GVB300-MB1	91GVB300-MB1
Toluene	1 U	1 U	76 %
Chlorobenzene	1 U	1 U	98 %
Ethylbenzene	1 U	1 U	1 U
Styrene	1 U	1 U	1 U
Xylene (total)	1 U	1 U	1 U

*- Outside of EPA CLP QC limits.

VOLATILES BY GC/MS, HSL LIST

Report Date: 09/12/91 16:53

RFW Batch Number: 91086851 Client: Ecko Housewares Work Order: 2994-02-03-0035

	Cust ID:	VBLK		VBLK		VBLK BS	
Sample Information	RFW#:	91GVB297-MB1		91GVB300-MB1		91GVB300-MB1	
	Matrix:	WATER		WATER		WATER	
	D.F.:	1.00		1.00		1.00	
	Units:	ug/L		ug/L		ug/L	
	Toluene-d8	100	%	99	%	91	%
Surrogate	Bromofluorobenzene	103	%	96	%	101	%
Recovery	1,2-Dichloroethane-d4	97	%	97	%	88	%
			fl		fl		fl
Chloromethane		2	U	2	U	2	U
Bromomethane		2	U	2	U	2	U
Vinyl Chloride		1	U	1	U	1	U
Chloroethane		2	U	2	U	2	U
Methylene Chloride		4		5		2	B
Acetone		5		2	U	2	U
Carbon Disulfide		1	U	1	U	1	U
1,1-Dichloroethene		1	U	1	U	51 *	%
1,1-Dichloroethane		1	U	1	U	1	U
1,2-Dichloroethene (total)		1	U	1	U	1	U
Chloroform		1	U	1	U	1	U
1,2-Dichloroethane		1	U	1	U	1	U
2-Butanone		2	U	2	U	2	U
1,1,1-Trichloroethane		1	U	1	U	1	U
Carbon Tetrachloride		1	U	1	U	1	U
Vinyl Acetate		2	U	2	U	2	U
Bromodichloromethane		1	U	1	U	1	U
1,2-Dichloropropane		1	U	1	U	1	U
cis-1,3-Dichloropropene		1	U	1	U	1	U
Trichloroethene		1	U	1	U	86	%
Dibromochloromethane		1	U	1	U	1	U
1,1,2-Trichloroethane		1	U	1	U	1	U
Benzene		1	U	1	U	77	%
Trans-1,3-Dichloropropene		1	U	1	U	1	U
Bromoform		1	U	1	U	1	U
4-Methyl-2-pentanone		2	U	2	U	2	U
2-Hexanone		2	U	2	U	2	U
Tetrachloroethene		1	U	1	U	1	U
1,1,2,2-Tetrachloroethane		1	U	1	U	1	U

*= Outside of EPA CLP QC limits.

Cust ID:	L-4	L-4	L-5	L-5	R-5	R-5
RFW#:	008 MS	008 MSD	009	009 DL	010	010 DL
Toluene	75 * %	77 %	1 U	NA	1 U	NA
Chlorobenzene	101 %	101 %	1 U	NA	1 U	NA
Ethylbenzene	1 U	1 U	1 U	NA	1 U	NA
Styrene	1 U	1 U	1 U	NA	1 U	NA
Xylene (total)	1 U	1 U	1 U	NA	1 U	NA

*= Outside of EPA CLP QC limits.

Sample Information	Cust ID:	L-4	L-4	L-5 (237)	L-5	R-5 (172)	R-5
	RFW#:	008 MS	008 MSD	009	009 DL	010	010 DL
	Matrix:	WATER	WATER	WATER	WATER	WATER	WATER
	D.F.:	1.00	1.00	1.00	5.00	1.00	5.00
	Units:	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
Surrogate Recovery	Toluene-d8	90 %	91 %	98 %	109 %	95 %	103 %
	Bromofluorobenzene	105 %	104 %	95 %	92 %	101 %	95 %
	1,2-Dichloroethane-d4	96 %	91 %	92 %	94 %	92 %	103 %
Chloromethane		2 U	2 U	2 U	NA	2 U	NA
Bromomethane		2 U	2 U	2 U	NA	2 U	NA
Vinyl Chloride		5	5	E [illegible]	[illegible]	E [illegible]	51
Chloroethane		2 U	2 U	2 U	NA	2 U	NA
Methylene Chloride		0.6 JB	0.8 JB	0.9 JB	NA	1 B	NA
Acetone		2 U	2 U	2 U	NA	2 U	NA
Carbon Disulfide		1 U	1 U	1 U	NA	1 U	NA
1,1-Dichloroethene		53 * %	54 * %	1 U	NA	1 U	NA
1,1-Dichloroethane		19	21	[illegible]	NA	4	NA
1,2-Dichloroethene (total)		64	67	E [illegible]	[illegible]	E [illegible]	54
Chloroform		1 U	1 U	1 U	NA	1 U	NA
1,2-Dichloroethane		1 U	1 U	1 U	NA	1 U	NA
2-Butanone		2 U	2 U	2 U	NA	2 U	NA
1,1,1-Trichloroethane		1 U	1 U	1 U	NA	1 U	NA
Carbon Tetrachloride		1 U	1 U	1 U	NA	1 U	NA
Vinyl Acetate		2 U	2 U	2 U	NA	2 U	NA
Bromodichloromethane		1 U	1 U	1 U	NA	1 U	NA
1,2-Dichloropropane		1 U	1 U	1 U	NA	1 U	NA
cis-1,3-Dichloropropene		1 U	1 U	1 U	NA	1 U	NA
Trichloroethene		84 %	86 %	1 U	NA	17	NA
Dibromochloromethane		1 U	1 U	1 U	NA	1 U	NA
1,1,2-Trichloroethane		1 U	1 U	1 U	NA	1 U	NA
Benzene		76 %	75 * %	1 U	NA	1 U	NA
Trans-1,3-Dichloropropene		1 U	1 U	1 U	NA	1 U	NA
Bromoform		1 U	1 U	1 U	NA	1 U	NA
4-Methyl-2-pentanone		2 U	2 U	2 U	NA	2 U	NA
2-Hexanone		2 U	2 U	2 U	NA	2 U	NA
Tetrachloroethene		1 U	1 U	1 U	NA	1 U	NA
1,1,2,2-Tetrachloroethane		1 U	1 U	1 U	NA	1 U	NA

*= Outside of EPA CLP QC limits.

WESTON-GULF COAST LABORATORIES, INC.
24** Bond St., University Park, Illinois 60466
Phones: (312) 534-5200 (2**) 385-7077 (815) 723-**53

ANALYTICAL REPORT

TO: Roy F. Weston, Incorporated
1 Weston Way
West Chester, PA 19380

ATTN: Ms. Sherrerd Steele

DATE: January 5, 1989

RE: Grdwater L-1-GW-001
American Home Products
W.O.# 2994-02-03
Sample Date: 11/17/88
Date Received: 11/18/88
GCL#: 144693

VOLATILE COMPOUNDS	RESULT	DETECTION LIMIT		
2-Chloroethyl vinyl ether	BDL	10	ug/l	U
1,3-Dichlorobenzene	BDL	10	ug/l	U
1,2-Dichlorobenzene	BDL	10	ug/l	U
1,4-Dichlorobenzene	BDL	10	ug/l	U

WESTON
MANAGERS DESIGNERS/CONSULTANTS

WESTON-GULF COAST LABORATORIES, INC.
2417 Bond St., University Park, Illinois 60466
Phones: (312) 534-5200 (219) 885-7077 (815) 723-75

ANALYTICAL REPORT

TO: Roy F. Weston, Incorporated
1 Weston Way
West Chester, PA 19380

ATTN: Ms. Sherrerd Steele

DATE: January 6, 1989

RE: Grdwater L-2-GW-001
American Home Products
W.O.# 2994-02-03
Sample Date: 11/17/88
Date Received: 11/18/88
GCL#: 144694

VOLATILE COMPOUNDS	RESULT	DETECTION LIMIT		
Chloromethane	BDL	10	ug/l	U
Bromomethane	BDL	10	ug/l	U
Vinyl Chloride	BDL	10	ug/l	U
Chloroethane	BDL	10	ug/l	U
Methylene Chloride	31	5	ug/l	(B)
Acetone	10	10	ug/l	(B)
Carbon Disulfide	BDL	5	ug/l	U
1,1-Dichloroethene	BDL	5	ug/l	U
1,1-Dichloroethane	BDL	5	ug/l	U
1,2-Dichloroethene (total)	BDL	5	ug/l	U
Chloroform	BDL	5	ug/l	U
1,2-Dichloroethane	BDL	5	ug/l	U
2-Butanone	BDL	10	ug/l	U
1,1,1-Trichloroethane	26	5	ug/l	
Carbon Tetrachloride	BDL	5	ug/l	U
Vinyl Acetate	BDL	10	ug/l	U
Bromodichloromethane	BDL	5	ug/l	U

WESTON-GULF COAST LABORATORIES INC.
2417 Bond St., University Park, Illinois 50466
Phones: (312) 534-5200 (219) 385-7077 (815) 723-753

ANALYTICAL REPORT

TO: Roy F. Weston, Incorporated
1 Weston Way
West Chester, PA 19380

ATTN: Ms. Sherrerd Steele

DATE: January 6, 1989

RE: Grdwater L-2-GW-001
American Home Products
W.O.# 2994-02-03
Sample Date: 11/17/88
Date Received: 11/18/88
GCL#: 144694

VOLATILE COMPOUNDS	RESULT	DETECTION LIMIT		
1,2-Dichloropropane	BDL	5	ug/l	U
Cis-1,3-Dichloropropene	BDL	5	ug/l	U
Trichloroethene	130	5	ug/l	
Dibromochloromethane	BDL	5	ug/l	U
1,1,2-Trichloroethane	BDL	5	ug/l	U
Benzene	BDL	5	ug/l	U
Trans-1,3-Dichloropropene	BDL	5	ug/l	U
Bromoform	BDL	5	ug/l	U
4-Methyl-2-Pentanone	BDL	10	ug/l	U
2-Hexanone	BDL	10	ug/l	U
Tetrachloroethene	BDL	5	ug/l	U
1,1,2,2-Tetrachloroethane	BDL	5	ug/l	U
Toluene	BDL	5	ug/l	U
Chlorobenzene	BDL	5	ug/l	U
Ethylbenzene	BDL	5	ug/l	U
Styrene	BDL	5	ug/l	U
Xylene	BDL	5	ug/l	U

WESTON-GULF COAST LABORATORIES, INC.
2417 Bond St., University Park, Illinois 60466
Phones: (312) 534-5200 (219) 885-7077 (815) 723-753

ANALYTICAL REPORT

TO: Roy F. Weston, Incorporated
1 Weston Way
West Chester, PA 19380

ATTN: Ms. Sherrerd Steele

DATE: January 6, 1989

RE: Grdwater L-2-GW-001
American Home Products
W.O.# 2994-02-03
Sample Date: 11/17/88
Date Received: 11/18/88
GCL#: 144694

VOLATILE COMPOUNDS	RESULT	DETECTION LIMIT
2-Chloroethyl vinyl ether	BDL	10 ug/l U
1,3-Dichlorobenzene	BDL	10 ug/l U
1,2-Dichlorobenzene	BDL	10 ug/l U
1,4-Dichlorobenzene	BDL	10 ug/l U

WESTON-GULF COAST LABORATORIES, INC.
2417 Bond St., University Park, Illinois 60466
Phones: (312) 534-5200 (219) 885-7077 (815) 723-7533

ANALYTICAL REPORT

BKGD
NO HITS

TO: Roy F. Weston, Incorporated
1 Weston Way
West Chester, PA 19380

ATTN: Ms. Sherrerd Steele

DATE: January 6, 1989

RE: Grdwater L-3-GW-001
American Home Products
W.O.# 2994-02-03
Sample Date: 11/17/88
Date Received: 11/18/88
GCL#: 144695

VOLATILE COMPOUNDS	RESULT	DETECTION LIMIT		
Chloromethane	BDL	10	ug/l	U
Bromomethane	BDL	10	ug/l	U
Vinyl Chloride	BDL	10	ug/l	U
Chloroethane	BDL	10	ug/l	U
Methylene Chloride	~~6~~	5	ug/l	B
Acetone	BDL	10	ug/l	U
Carbon Disulfide	BDL	5	ug/l	U
1,1-Dichloroethene	BDL	5	ug/l	U
1,1-Dichloroethane	BDL	5	ug/l	U
1,2-Dichloroethene (total)	BDL	5	ug/l	U
Chloroform	BDL	5	ug/l	U
1,2-Dichloroethane	BDL	5	ug/l	U
2-Butanone	BDL	10	ug/l	U
1,1,1-Trichloroethane	BDL	5	ug/l	U
Carbon Tetrachloride	BDL	5	ug/l	U
Vinyl Acetate	BDL	10	ug/l	U
Bromodichloromethane	BDL	5	ug/l	U

WESTON-GULF COAST LABORATORIES, INC
24[illegible] Bond St., University Park, Illinois 60466
Phones: (312) 534-5200 (219) 385-707[illegible] (815) [illegible]

ANALYTICAL REPORT

TO: Roy F. Weston, Incorporated
1 Weston Way
West Chester, PA 19380

ATTN: Ms. Sherrerd Steele

DATE: January 6, 1989

RE: Grdwater L-3-GW-001
American Home Products
W.O.# 2994-02-03
Sample Date: 11/17/88
Date Received: 11/18/88
GCL#: 144695

VOLATILE COMPOUNDS	RESULT	DETECTION LIMIT		
1,2-Dichloropropane	BDL	5	ug/l	U
Cis-1,3-Dichloropropene	BDL	5	ug/l	U
Trichloroethene	BDL	5	ug/l	U
Dibromochloromethane	BDL	5	ug/l	U
1,1,2-Trichloroethane	BDL	5	ug/l	U
Benzene	BDL	5	ug/l	U
Trans-1,3-Dichloropropene	BDL	5	ug/l	U
Bromoform	BDL	5	ug/l	U
4-Methyl-2-Pentanone	BDL	10	ug/l	U
2-Hexanone	BDL	10	ug/l	U
Tetrachloroethene	BDL	5	ug/l	U
1,1,2,2-Tetrachloroethane	BDL	5	ug/l	U
Toluene	BDL	5	ug/l	U
Chlorobenzene	BDL	5	ug/l	U
Ethylbenzene	BDL	5	ug/l	U
Styrene	BDL	5	ug/l	U
Xylene	BDL	5	ug/l	U

WESTON-GULF COAST LABORATORIES, INC.
2417 Bond St., University Park, Illinois 60466
Phones: (312) 534-5200 (219) 385-7077 (815) 723-7531

ANALYTICAL REPORT

TO: Roy F. Weston, Incorporated
1 Weston Way
West Chester, PA 19380

ATTN: Ms. Sherrerd Steele

DATE: January 6, 1989

RE: Grdwater L-3-GW-001
American Home Products
W.O.# 2994-02-03
Sample Date: 11/17/88
Date Received: 11/18/88
GCL#: 144695

VOLATILE COMPOUNDS	RESULT	DETECTION LIMIT
2-Chloroethyl vinyl ether	BDL	10 ug/l U
1,3-Dichlorobenzene	BDL	10 ug/l U
1,2-Dichlorobenzene	BDL	10 ug/l U
1,4-Dichlorobenzene	BDL	10 ug/l U

WESTON-GULF COAST LABORATORIES, INC.
2417 Bond St., University Park, Illinois 60466
Phones: (312) 534-5200 (219) 885-7077 (815) 723-7533

ANALYTICAL REPORT

TO: Roy F. Weston, Inc.
1 Weston Way
West Chester, PA 19380

ATTN: Ms. Sherrerd Steele

DATE: January 6, 1989

RE: Ground Water L-4-GW-001
American Home Products
W.O.# 2994-02-03
Sample Date: 11/18/88
Date Received: 11/21/88
GCL#: 144858

VOLATILE COMPOUNDS	RESULT	DETECTION LIMIT		
Chloromethane	BDL	10	ug/l	U
Bromomethane	BDL	10	ug/l	U
Vinyl Chloride	BDL	10	ug/l	U
Chloroethane	BDL	10	ug/l	U
Methylene Chloride	5	5	ug/l	
Acetone	BDL	10	ug/l	U
Carbon Disulfide	BDL	5	ug/l	U
1,1-Dichloroethene	BDL	5	ug/l	U
1,1-Dichloroethane	BDL	5	ug/l	U
1,2-Dichloroethene (total)	BDL	5	ug/l	U
Chloroform	BDL	5	ug/l	U
1,2-Dichloroethane	BDL	5	ug/l	U
2-Butanone	BDL	10	ug/l	U
1,1,1-Trichloroethane	BDL	5	ug/l	U
Carbon Tetrachloride	BDL	5	ug/l	U
Vinyl Acetate	BDL	10	ug/l	U
Bromodichloromethane	BDL	5	ug/l	U

WESTON-GULF COAST LABORATORIES, INC.
2417 Bond St., University Park, Illinois 60466
Phones: (312) 534-5200 (219) 885-7077 (815) 723-753

ANALYTICAL REPORT

TO: Roy F. Weston, Inc.
1 Weston Way
West Chester, PA 19380

ATTN: Ms. Sherrerd Steele

DATE: January 6, 1989

RE: Ground Water L-4-GW-001
American Home Products
W.O.# 2994-02-03
Sample Date: 11/18/88
Date Received: 11/21/88
GCL#: 144858

VOLATILE COMPOUNDS	RESULT	DETECTION LIMIT		
1,2-Dichloropropane	BDL	5	ug/l	U
Cis-1,3-Dichloropropene	BDL	5	ug/l	U
Trichloroethene	BDL	5	ug/l	U
Dibromochloromethane	BDL	5	ug/l	U
1,1,2-Trichloroethane	BDL	5	ug/l	U
Benzene	BDL	5	ug/l	U
Trans-1,3-Dichloropropene	BDL	5	ug/l	U
Bromoform	BDL	5	ug/l	U
4-Methyl-2-Pentanone	BDL	10	ug/l	U
2-Hexanone	BDL	10	ug/l	U
Tetrachloroethene	BDL	5	ug/l	U
1,1,2,2-Tetrachloroethane	BDL	5	ug/l	U
Toluene	BDL	5	ug/l	U
Chlorobenzene	BDL	5	ug/l	U
Ethylbenzene	BDL	5	ug/l	U
Styrene	BDL	5	ug/l	U
Xylene	BDL	5	ug/l	U

WESTON-GULF COAST LABORATORIES, INC.
2417 Bond St., University Park, Illinois 60466
Phones: (312) 534-5200 (219) 885-7077 (815) 723-7535

ANALYTICAL REPORT

TO: Roy F. Weston, Inc.
1 Weston Way
West Chester, PA 19380

ATTN: Ms. Sherrerd Steele

DATE: January 6, 1989

RE: Ground Water L-4-GW-001
American Home Products
W.O.# 2994-02-03
Sample Date: 11/18/88
Date Received: 11/21/88
GCL#: 144858

VOLATILE COMPOUNDS	RESULT	DETECTION LIMIT		
2-Chloroethyl vinyl ether	BDL	10	ug/l	U
1,3-Dichlorobenzene	BDL	10	ug/l	U
1,2-Dichlorobenzene	BDL	10	ug/l	U
1,4-Dichlorobenzene	BDL	10	ug/l	U

APPENDIX B

EXPOSURE DOSE AND RISK CHARACTERIZATION TABLES

TABLE B-1

POTENTIAL CARCINOGENIC AND NONCARCINOGENIC HEALTH RISKS ASSOCIATED WITH INGESTION OF CHEMICALS IN RESIDENTIAL WELL WATER:
UPPER UNIT
EKCO HOUSEWARES
MASSILLON, OHIO

Chemical	Exposure Point Concentration (ug/L)	Cancer Slope Factor (CSF) (mg/kg/day)-1	Chronic Reference Dose (RfD) (mg/kg/day)	Adult: Potential Chronic Daily Intake (CDI) (mg/kg/day)	Adult: Potential Lifetime Cancer Risk (CDI x CSF)	Adult: Potential Hazard Index (HI) (CDI/(ED/70))/RfD	Child: Potential Chronic Daily Intake (CDI) (mg/kg/day)	Child: Potential Lifetime Cancer Risk (CDI x CSF)	Child: Potential Hazard Index (HI) (CDI/(ED/70))/RfD
Organics									
1,1-Dichloroethane	451	ND	1.0E-01	4.2E-03	--	1.2E-01	2.5E-03	--	2.9E-01
1,1-Dichloroethene	220	6.0E-01	9.0E-03	2.1E-03	1.2E-03	6.7E-01	1.2E-03	7.2E-04	1.6E+00
1,2-Dichloroethene (total)	93.7	NC	9.0E-03	8.8E-04	--	2.9E-01	5.1E-04	--	6.7E-01
1,1,1-Trichloroethane	5380	NC	ND	5.1E-02	--	--	2.9E-02	--	--
Trichloroethene	22300	1.1E-02	6.0E-03	2.1E-01	2.3E-03	1.0E+02	1.2E-01	1.3E-03	2.4E+02
Vinyl chloride	28.4	1.9E+00	ND	2.7E-04	5.1E-04	--	1.6E-04	3.0E-04	--
Chloroethane	3.19	NC	ND	3.0E-05	--	--	1.7E-05	--	--
Acetone	4.25	NC	1.0E-01	4.0E-05	--	1.2E-03	2.3E-05	--	2.7E-03
1,2-Dichloroethane	9.24	9.1E-02	ND	8.7E-05	7.9E-06	--	5.1E-05	4.6E-06	--
2-Butanone	2.6	NC	6.0E-01	2.4E-05	--	1.2E-04	1.4E-05	--	2.8E-04
1,1,2-Trichloroethane	15.61	5.7E-02	4.0E-03	1.5E-04	8.4E-06	1.1E-01	8.6E-05	4.9E-06	2.5E-01
Tetrachloroethene	7.71	5.2E-02	1.0E-02	7.2E-05	3.8E-06	2.1E-02	4.2E-05	2.2E-06	4.9E-02
Toluene	12.6	NC	2.0E-01	1.2E-04	--	1.7E-03	6.9E-05	--	4.0E-03
Ethylbenzene	1.41	NC	1.0E-01	1.3E-05	--	3.9E-04	7.7E-06	--	9.0E-04
Benzene	1.45	2.9E-02	ND	1.4E-05	3.9E-07	--	7.9E-06	2.3E-07	--
Xylenes (total)	1.56	NC	2.0E+00	1.5E-05	--	2.1E-05	8.5E-06	--	5.0E-05
Carbon disulfide	1.1	NC	1.0E-01	1.0E-05	--	3.0E-04	6.0E-06	--	7.0E-04
Chloroform	1.99	6.1E-03	1.0E-02	1.9E-05	1.1E-07	5.5E-03	1.1E-05	6.7E-08	1.3E-02
4-Methyl-2-pentanone	2.92	NC	8.0E-02	2.7E-05	--	1.0E-03	1.6E-05	--	2.3E-03
				Totals:	4.1E-03	1.0E+02	Totals:	2.4E-03	2.4E+02
						Total Lifetime Cancer Risk (Adult + Child) =		6.4E-03	

CDI = (GW Concentration x IR x CF x EF x ED) / (BW x AT)

NC - Not Carcinogenic.

ND - Not Determined.

Exposure Assumptions

Adult:		Child:	
2	IR = Ingestion Rate (L/day)	1	IR = Ingestion Rate (L/day)
0.001	CF = Conversion Factor (mg/ug)	0.001	CF = Conversion Factor (mg/ug)
350	EF = Exposure Frequency (days/year)	350	EF = Exposure Frequency (days/year)
24	ED = Exposure Duration (years)	6	ED = Exposure Duration (years)
70	BW = Body Weight (kg)	15	BW = Body Weight (kg)
25550	AT = Averaging Time (days)	25550	AT = Averaging Time (days)

TABLE B-2

POTENTIAL CARCINOGENIC AND NONCARCINOGENIC HEALTH RISKS ASSOCIATED WITH DERMAL ABSORPTION FROM RESIDENTIAL WELL WATER WHILE BATHING:
UPPER UNIT
EKCO HOUSEWARES
MASSILLON, OHIO

Chemical	Exposure Point Concentration (µg/L)	Permeability Coefficient (PC) (cm/hr)	Cancer Slope Factor (CSF) (mg/kg/day)-1	Chronic Reference Dose (RfD) (mg/kg/day)	Adult: Potential Chronic Daily Intake (CDI) (mg/kg/day)	Adult: Potential Lifetime Cancer Risk (CDI x CSF)	Adult: Potential Hazard Index (HI) (CDI/(ED/70))/RfD	Child: Potential Chronic Daily Intake (CDI) (mg/kg/day)	Child: Potential Lifetime Cancer Risk (CDI x CSF)	Child: Potential Hazard Index (HI) (CDI/(ED/70))/RfD
Organics										
1,1-Dichloroethane	451	8.9E-03	ND	8.0E-02	1.1E-04	--	4.0E-03	4.8E-05	--	7.0E-03
1,1-Dichloroethene	220	1.6E-02	7.5E-01	7.2E-03	9.5E-05	7.1E-05	3.9E-02	4.2E-05	3.2E-05	6.8E-02
1,2-Dichloroethene (total)	93.7	1.0E-02	NC	7.2E-03	2.5E-05	--	1.0E-02	1.1E-05	--	1.8E-02
1,1,1-Trichloroethane	5380	1.7E-02	NC	ND	2.5E-03	--	--	1.1E-03	--	--
Trichloroethene	22300	1.6E-02	1.4E-02	4.8E-03	9.6E-03	1.3E-04	5.9E+00	4.3E-03	6.0E-05	1.0E+01
Vinyl chloride	28.4	7.3E-03	2.0E+00	ND	5.6E-06	1.1E-05	--	2.5E-06	5.0E-06	--
Chloroethane	3.19	8.0E-03	NC	ND	6.9E-07	--	--	3.1E-07	--	--
Acetone	4.25	NA	NC	8.0E-02	0.0E+00	--	--	0.0E+00	--	--
1,2-Dichloroethane	9.24	5.3E-03	1.1E-01	ND	1.3E-06	1.5E-07	--	5.9E-07	6.5E-08	--
2-Butanone	2.6	1.1E-03	NC	4.8E-01	7.7E-08	--	4.7E-07	3.4E-08	--	8.3E-07
1,1,2-Trichloroethane	15.61	8.4E-03	7.1E-02	3.2E-03	3.5E-06	2.5E-07	3.2E-03	1.6E-06	1.1E-07	5.7E-03
Tetrachloroethene	7.71	4.8E-02	6.5E-02	8.0E-03	1.0E-05	6.5E-07	3.6E-03	4.4E-06	2.9E-07	6.5E-03
Toluene	12.6	4.5E-02	NC	1.6E-01	1.5E-05	--	2.8E-04	6.8E-06	--	5.0E-04
Ethylbenzene	1.41	7.4E-02	NC	8.0E-02	2.8E-06	--	1.0E-04	1.3E-06	--	1.8E-04
Benzene	1.45	2.1E-02	3.6E-02	ND	8.2E-07	3.0E-08	--	3.7E-07	1.3E-08	--
Xylenes (total)	1.56	8.0E-02	NC	1.6E+00	3.4E-06	--	6.1E-06	1.5E-06	--	1.1E-05
Carbon disulfide	1.1	2.4E-02	NC	8.0E-02	7.1E-07	--	2.6E-05	3.2E-07	--	4.6E-05
Chloroform	1.99	8.9E-03	7.6E-03	8.0E-03	4.8E-07	3.6E-09	1.7E-04	2.1E-07	1.6E-09	3.1E-04
4-Methyl-2-pentanone	2.92	3.3E-03	NC	6.4E-02	2.6E-07	--	1.2E-05	1.2E-07	--	2.1E-05
					Totals:	**2.2E-04**	**5.9E+00**	**Totals:**	**9.7E-05**	**1.1E+01**
					Total Lifetime Cancer Risk (Adult + Child)				**3.2E-04**	

CDI = (GW Concentration x SA x VF x CF x ET x EF x ED) / (BW x AT)
NC - Not Carcinogenic.
ND - Not Determined.
NA - Not Available.

Exposure Assumptions

Adult		Child	
23000	SA = Skin Surface Area (cm^2/day)	8760	SA = Skin Surface Area (cm^2/day)
0.001	VF = Volumetric Conv. Factor (L/cm^3)	0.001	VF = Volumetric Conv. Factor (L/cm^3)
0.001	CF = Conversion Factor (mg/ug)	0.001	CF = Conversion Factor (mg/ug)
0.25	ET = Exposure Time (hours/day)	0.25	ET = Exposure Time (hours/day)
350	EF = Exposure Frequency (days/year	350	EF = Exposure Frequency (days/year)
24	ED = Exposure Duration (years)	6	ED = Exposure Duration (years)
70	BW = Body Weight (kg)	15	BW = Body Weight (kg)
25550	AT = Averaging Time (days)	25550	AT = Averaging Time (days)

TABLE B-3

POTENTIAL CARCINOGENIC AND NONCARCINOGENIC HEALTH RISKS ASSOCIATED WITH NONINGESTION (INHALATION) USES OF RESIDENTIAL WELL WATER:
UPPER UNIT
EKCO HOUSEWARES
MASSILLON, OHIO

Chemical	Exposure Point Concentration (µg/L)	Cancer Slope Factor (CSF) (mg/kg/day)-1	Chronic Reference Dose (RfD) (mg/kg/day)	Adult: Potential Chronic Daily Intake (CDI) (mg/kg/day)	Adult: Potential Lifetime Cancer Risk (CDI x CSF)	Adult: Potential Hazard Index (HI) (CDI/(ED/70))/RfD	Child: Potential Chronic Daily Intake (CDI) (mg/kg/day)	Child: Potential Lifetime Cancer Risk (CDI x CSF)	Child: Potential Hazard Index (HI) (CDI/(ED/70))/RfD
Organics									
1,1-Dichloroethane	451	ND	1.0E-01	1.6E-02	--	4.6E-01	1.9E-02	--	2.2E+00
1,1-Dichloroethene	220	1.2E+00	9.0E-03	7.7E-03	9.3E-03	2.5E+00	9.0E-03	1.1E-02	1.2E+01
1,2-Dichloroethene (total)	93.7	NC	9.0E-03	3.3E-03	--	1.1E+00	3.9E-03	--	5.0E+00
1,1,1-Trichloroethane	5380	NC	1.0E+00	1.9E-01	--	5.5E-01	2.2E-01	--	2.6E+00
Trichloroethene	22300	6.0E-03	1.0E-01	7.9E-01	4.7E-03	2.3E+01	9.2E-01	5.5E-03	1.1E+02
Vinyl chloride	28.4	3.0E-01	ND	1.0E-03	3.0E-04	--	1.2E-03	3.5E-04	--
Chloroethane	3.19	NC	2.9E+00	1.1E-04	--	1.1E-04	1.3E-04	--	5.3E-04
Acetone	4.25	NC	1.0E-01	1.5E-04	--	4.4E-03	1.7E-04	--	2.0E-02
1,2-Dichloroethane	9.24	9.1E-02	ND	3.3E-04	3.0E-05	--	3.8E-04	3.5E-05	--
2-Butanone	2.6	NC	2.9E-01	9.2E-05	--	9.2E-04	1.1E-04	--	4.3E-03
1,1,2-Trichloroethane	15.61	5.7E-02	4.0E-03	5.5E-04	3.1E-05	4.0E-01	6.4E-04	3.7E-05	1.9E+00
Tetrachloroethene	7.71	2.0E-03	1.0E-02	2.7E-04	5.4E-07	7.9E-02	3.2E-04	6.3E-07	3.7E-01
Toluene	12.6	NC	1.1E-01	4.4E-04	--	1.2E-02	5.2E-04	--	5.5E-02
Ethylbenzene	1.41	NC	2.9E-01	5.0E-05	--	5.0E-04	5.8E-05	--	2.3E-03
Benzene	1.45	2.9E-02	ND	5.1E-05	1.5E-06	--	6.0E-05	1.7E-06	--
Xylenes (total)	1.56	NC	2.0E+00	5.5E-05	--	8.0E-05	6.4E-05	--	3.7E-04
Carbon disulfide	1.1	NC	2.9E-03	3.9E-05	--	3.9E-02	4.5E-05	--	1.8E-01
Chloroform	1.99	8.1E-02	1.0E-02	7.0E-05	5.7E-06	2.0E-02	8.2E-05	6.6E-06	9.5E-02
4-Methyl-2-pentanone	2.92	NC	2.0E-02	1.0E-04	--	1.5E-02	1.2E-04	--	7.0E-02
				Totals:	**1.4E-02**	**2.8E+01**	**Totals:**	**1.7E-02**	**1.3E+02**
				Total Lifetime Cancer Risk (Adult + Child) =				**3.1E-02**	

CDI = (GW Concentration x IR x K x CF x EF x ED) / (BW x AT)
NC - Not Carcinogenic.
ND - Not Determined.

Exposure Assumptions

Adult:		Child:	
15	IR = Inhalation Rate (m^3/day)	15	IR = Inhalation Rate (m^3/day)
0.5	K = Volatilization Factor (L/m^3)	0.5	K = Volatilization Factor (L/m^3)
0.001	CF = Conversion Factor (mg/ug)	0.001	CF = Conversion Factor (mg/ug)
350	EF = Exposure Frequency (days/year)	350	EF = Exposure Frequency (days/year)
24	ED = Exposure Duration (years)	6	ED = Exposure Duration (years)
70	BW = Body Weight (kg)	15	BW = Body Weight (kg)
25550	AT = Averaging Time (days)	25550	AT = Averaging Time (days)

TABLE B-4

POTENTIAL CARCINOGENIC AND NONCARCINOGENIC HEALTH RISKS ASSOCIATED WITH INGESTION OF CHEMICALS IN GARDEN PRODUCE:
UPPER UNIT
EKCO HOUSEWARES
MASSILLON, OHIO

Chemical	Leafy Vegetable Exposure Point Concentration (mg/kg)	Garden Fruit Exposure Point Concentration (mg/kg)	Root Vegetable Exposure Point Concentration (mg/kg)	Cancer Slope Factor (CSF) (mg/kg/day)-1	Chronic Reference Dose (RfD) (mg/kg/day)	Adult: Potential Chronic Daily Intake (CDI) (mg/kg/day)	Adult: Potential Lifetime Cancer Risk (CDI x CSF)	Adult: Potential Hazard Index (HI) (CDI/(ED/70))/RfD	Child: Potential Chronic Daily Intake (CDI) (mg/kg/day)	Child: Potential Lifetime Cancer Risk (CDI x CSF)	Child: Potential Hazard Index (HI) (CDI/(ED/70))/RfD
Organics											
1,1-Dichloroethane	4.94E-02	4.94E-02	6.90E-01	ND	1.0E-01	1.6E-04	--	4.7E-03	1.3E-04	--	1.5E-02
1,1-Dichloroethene	4.27E-02	4.27E-02	3.80E-01	6.0E-01	9.0E-03	9.4E-05	5.7E-05	3.1E-02	7.5E-05	4.5E-05	9.7E-02
1,2-Dichloroethene (total)	1.32E-02	1.32E-02	1.92E-01	NC	9.0E-03	4.5E-05	--	1.4E-02	3.6E-05	--	4.6E-02
1,1,1-Trichloroethane	1.13E+00	1.13E+00	1.55E+01	NC	ND	3.6E-03	--	--	2.9E-03	--	--
Trichloroethene	1.60E+00	1.60E+00	1.31E+02	1.1E-02	6.0E-03	2.8E-02	3.1E-04	1.3E+01	2.3E-02	2.5E-04	4.4E+01
Vinyl chloride	1.21E-03	1.21E-03	2.58E-02	1.9E+00	ND	5.8E-06	1.1E-05	--	4.7E-06	8.9E-06	--
Chloroethane	5.96E-05	5.96E-05	3.83E-03	NC	ND	8.1E-07	--	--	6.6E-07	--	--
Acetone	8.42E-05	8.42E-05	3.57E-03	NC	1.0E-01	7.7E-07	--	2.2E-05	6.3E-07	--	7.3E-05
1,2-Dichloroethane	8.51E-04	8.51E-04	1.13E-02	9.1E-02	ND	2.6E-06	2.4E-07	--	2.1E-06	1.9E-07	--
2-Butanone	8.53E-05	8.53E-05	2.26E-03	NC	6.0E-01	5.0E-07	--	2.4E-06	4.0E-07	--	7.9E-06
1,1,2-Trichloroethane	1.87E-03	1.87E-03	3.53E-02	5.7E-02	4.0E-03	8.0E-06	4.5E-07	5.6E-03	6.4E-06	3.7E-07	1.9E-02
Tetrachloroethene	2.55E-03	2.55E-03	3.01E-02	5.2E-02	1.0E-02	7.2E-06	3.7E-07	2.1E-03	5.7E-06	3.0E-07	6.7E-03
Toluene	1.97E-03	1.97E-03	4.99E-02	NC	2.0E-01	1.1E-05	--	1.6E-04	8.9E-06	--	5.2E-04
Ethylbenzene	1.61E-04	1.61E-04	1.12E-02	NC	1.0E-01	2.4E-06	--	6.9E-05	1.9E-06	--	2.3E-04
Benzene	3.02E-04	3.02E-04	2.82E-03	2.9E-02	ND	6.9E-07	2.0E-08	--	5.5E-07	1.6E-06	--
Xylenes (total)	6.30E-04	6.30E-04	1.28E-02	NC	2.0E+00	2.9E-06	--	4.2E-06	2.3E-06	--	1.4E-05
Carbon disulfide	8.43E-04	8.43E-04	2.12E-03	NC	1.0E-01	7.5E-07	--	2.2E-05	5.6E-07	--	6.5E-05
Chloroform	2.54E-04	2.54E-04	3.51E-03	6.1E-03	1.0E-02	8.2E-07	5.0E-09	2.4E-04	6.6E-07	4.0E-09	7.7E-04
4-Methyl-2-pentanone	1.63E-04	1.63E-04	3.00E-03	NC	8.0E-02	6.8E-07	--	2.5E-05	5.5E-07	--	8.0E-05
						Totals:	3.7E-04	1.4E+01	Totals:	3.0E-04	4.4E+01
							Total Lifetime Cancer Risk (Adult + Child) =			6.8E-04	

CDI = ((Leafy Vegetable Conc. x IR-lv) + (Garden Fruit Conc. x IR-gf) + (Root Vegetable Conc. x IR-rv) x EF x ED) / (BW x AT)

NC = Not Carcinogenic.

ND = Not Determined.

Exposure Assumptions

Adult:		Child:	
0.036	IR-lv = Leafy Vegetable Ingestion Rate (kg/day)	0.017	IR-lv = Leafy Vegetable Ingestion Rate (kg/day)
0.042	IR-gf = Garden Fruit Ingestion Rate (kg/day)	0.026	IR-gf = Garden Fruit Ingestion Rate (kg/day)
0.044	IR-rv = Root Vegetable Ingestion Rate (kg/day)	0.031	IR-rv = Root Vegetable Ingestion Rate (kg/day)
350	EF = Exposure Frequency (days/year)	350	EF = Exposure Frequency (days/year)
24	ED = Exposure Duration (years)	6	ED = Exposure Duration (years)
70	BW = Body Weight (kg)	15	BW = Body Weight (kg)
25550	AT = Averaging Time (days)	25550	AT = Averaging Time (days)

TABLE B-5

POTENTIAL CARCINOGENIC AND NONCARCINOGENIC HEALTH RISKS ASSOCIATED WITH INGESTION OF CHEMICALS IN RESIDENTIAL WELL WATER:
LOWER UNIT
EKCO HOUSEWARES
MASSILLON, OHIO

Chemical	Exposure Point Concentration (ug/L)	Cancer Slope Factor (CSF) (mg/kg/day)-1	Chronic Reference Dose (RfD) (mg/kg/day)	Adult: Potential Chronic Daily Intake (CDI) (mg/kg/day)	Adult: Potential Lifetime Cancer Risk (CDI x CSF)	Adult: Potential Hazard Index (HI) (CDI/(ED/70))/RfD	Child: Potential Chronic Daily Intake (CDI) (mg/kg/day)	Child: Potential Lifetime Cancer Risk (CDI x CSF)	Child: Potential Hazard Index (HI) (CDI/(ED/70))/RfD
Organics									
1,1-Dichloroethane	101.67	ND	1.0E-01	9.6E-04	--	2.8E-02	5.6E-04	--	6.5E-02
1,1-Dichloroethene	31.26	6.0E-01	9.0E-03	2.9E-04	1.8E-04	9.5E-02	1.7E-04	1.0E-04	2.2E-01
1,2-Dichloroethene (total)	142.44	NC	9.0E-03	1.3E-03	--	4.3E-01	7.8E-04	--	1.0E+00
1,1,1-Trichloroethane	613.45	NC	ND	5.8E-03	--	--	3.4E-03	--	--
Trichloroethene	234.19	1.1E-02	6.0E-03	2.2E-03	2.4E-05	1.1E+00	1.3E-03	1.4E-05	2.5E+00
Vinyl chloride	8.15	1.9E+00	ND	7.7E-05	1.5E-04	--	4.5E-05	8.5E-05	--
				Totals:	**3.5E-04**	**1.6E+00**	**Totals:**	**2.0E-04**	**3.8E+00**
				Total Lifetime Cancer Risk (Adult + Child) =				**5.5E-04**	

CDI = (GW Concentration x IR x CF x EF x ED) / (BW x AT)
NC - Not Carcinogenic.
ND - Not Determined.

Exposure Assumptions

Adult:		Child:	
2	IR = Ingestion Rate (L/day)	1	IR = Ingestion Rate (L/day)
0.001	CF = Conversion Factor (mg/ug)	0.001	CF = Conversion Factor (mg/ug)
350	EF = Exposure Frequency (days/year)	350	EF = Exposure Frequency (days/year)
24	ED = Exposure Duration (years)	6	ED = Exposure Duration (years)
70	BW = Body Weight (kg)	15	BW = Body Weight (kg)
25550	AT = Averaging Time (days)	25550	AT = Averaging Time (days)

TABLE B-6

POTENTIAL CARCINOGENIC AND NONCARCINOGENIC HEALTH RISKS ASSOCIATED WITH DERMAL ABSORPTION FROM RESIDENTIAL WELL WATER WHILE BATHING: LOWER UNIT
EKCO HOUSEWARES
MASSILLON, OHIO

Chemical	Exposure Point Concentration (µg/L)	Permeability Coefficient (PC) (cm/hr)	Cancer Slope Factor (CSF) (mg/kg/day)-1	Chronic Reference Dose (RfD) (mg/kg/day)	Adult: Potential Chronic Daily Intake (CDI) (mg/kg/day)	Adult: Potential Lifetime Cancer Risk (CDI x CSF)	Adult: Potential Hazard Index (HI) (CDI/(ED/70))/RfD	Child: Potential Chronic Daily Intake (CDI) (mg/kg/day)	Child: Potential Lifetime Cancer Risk (CDI x CSF)	Child: Potential Hazard Index (HI) (CDI/(ED/70))/RfD
Organics										
1,1-Dichloroethane	101.67	8.9E-03	ND	8.0E-02	2.4E-05	--	8.9E-04	1.1E-05	--	1.6E-03
1,1-Dichloroethene	31.26	1.6E-02	7.5E-01	7.2E-03	1.4E-05	1.0E-05	5.5E-03	6.0E-06	4.5E-06	9.7E-03
1,2-Dichloroethene (total)	142.44	1.0E-02	NC	7.2E-03	3.8E-05	--	1.6E-02	1.7E-05	--	2.8E-02
1,1,1-Trichloroethane	613.45	1.7E-02	NC	ND	2.8E-04	--	--	1.3E-04	--	--
Trichloroethene	234.19	1.6E-02	1.4E-02	4.8E-03	1.0E-04	1.4E-06	6.1E-02	4.5E-05	6.3E-07	1.1E-01
Vinyl chloride	8.15	7.3E-03	2.0E+00	ND	1.6E-06	3.2E-06	--	7.1E-07	1.4E-06	--
					Totals:	**1.5E-05**	**8.3E-02**	**Totals:**	**6.6E-06**	**1.5E-01**
					Total Lifetime Cancer Risk (Adult + Child):				**2.1E-05**	

CDI = (GW Concentration x SA x VF x CF x ET x EF x ED) / (BW x AT)
NC – Not Carcinogenic.
ND – Not Determined.

Exposure Assumptions

Adult		Child	
23000	SA = Skin Surface Area (cm^2/day)	8760	SA = Skin Surface Area (cm^2/day)
0.001	VF = Volumetric Conv. Factor (L/cm^3)	0.001	VF = Volumetric Conv. Factor (L/cm^3)
0.001	CF = Conversion Factor (mg/ug)	0.001	CF = Conversion Factor (mg/ug)
0.25	ET = Exposure Time (hours/day)	0.25	ET = Exposure Time (hours/day)
350	EF = Exposure Frequency (days/year	350	EF = Exposure Frequency (days/year)
24	ED = Exposure Duration (years)	6	ED = Exposure Duration (years)
70	BW = Body Weight (kg)	15	BW = Body Weight (kg)
25550	AT = Averaging Time (days)	25550	AT = Averaging Time (days)

TABLE B-7

POTENTIAL CARCINOGENIC AND NONCARCINOGENIC HEALTH RISKS ASSOCIATED WITH NONINGESTION (INHALATION) USES OF RESIDENTIAL WELL WATER:
LOWER UNIT
EKCO HOUSEWARES
MASSILLON, OHIO

Chemical	Exposure Point Concentration (ug/L)	Cancer Slope Factor (CSF) (mg/kg/day)-1	Chronic Reference Dose (RfD) (mg/kg/day)	Adult: Potential Chronic Daily Intake (CDI) (mg/kg/day)	Adult: Potential Lifetime Cancer Risk (CDI x CSF)	Adult: Potential Hazard Index (HI) (CDI/(ED/70))/RfD	Child: Potential Chronic Daily Intake (CDI) (mg/kg/day)	Child: Potential Lifetime Cancer Risk (CDI x CSF)	Child: Potential Hazard Index (HI) (CDI/(ED/70))/RfD
Organics									
1,1-Dichloroethane	101.67	ND	1.0E-01	3.6E-03	--	1.0E-01	4.2E-03	--	4.9E-01
1,1-Dichloroethene	31.26	1.2E+00	9.0E-03	1.1E-03	1.3E-03	3.6E-01	1.3E-03	1.5E-03	1.7E+00
1,2-Dichloroethene (total)	142.44	NC	9.0E-03	5.0E-03	--	1.6E+00	5.9E-03	--	7.6E+00
1,1,1-Trichloroethane	613.45	NC	1.0E+00	2.2E-02	--	6.3E-02	2.5E-02	--	2.9E-01
Trichloroethene	234.19	6.0E-03	1.0E-01	8.2E-03	4.9E-05	2.4E-01	9.6E-03	5.8E-05	1.1E+00
Vinyl chloride	8.15	3.0E-01	ND	2.9E-04	8.6E-05	--	3.3E-04	1.0E-04	--
				Totals:	**1.5E-03**	**2.4E+00**	**Totals:**	**1.7E-03**	**1.1E+01**
						Total Lifetime Cancer Risk (Adult + Child) =		**3.2E-03**	

CDI = (GW Concentration x IR x K x CF x EF x ED) / (BW x AT)
NC - Not Carcinogenic.
ND - Not Determined.

Exposure Assumptions

Adult:		Child:	
15	IR = Inhalation Rate (m^3/day)	15	IR = Inhalation Rate (m^3/day)
0.5	K = Volatilization Factor (L/m^3)	0.5	K = Volatilization Factor (L/m^3)
0.001	CF = Conversion Factor (mg/ug)	0.001	CF = Conversion Factor (mg/ug)
350	EF = Exposure Frequency (days/year)	350	EF = Exposure Frequency (days/year)
24	ED = Exposure Duration (years)	6	ED = Exposure Duration (years)
70	BW = Body Weight (kg)	15	BW = Body Weight (kg)
25550	AT = Averaging Time (days)	25550	AT = Averaging Time (days)

TABLE B-8

POTENTIAL CARCINOGENIC AND NONCARCINOGENIC HEALTH RISKS ASSOCIATED WITH
INGESTION OF CHEMICALS IN GARDEN PRODUCE:
LOWER UNIT
EKCO HOUSEWARES
MASSILLON, OHIO

Chemical	Leafy Vegetable Exposure Point Concentration (mg/kg)	Garden Fruit Exposure Point Concentration (mg/kg)	Root Vegetable Exposure Point Concentration (mg/kg)	Cancer Slope Factor (CSF) (mg/kg/day)-1	Chronic Reference Dose (RfD) (mg/kg/day)	Adult: Potential Chronic Daily Intake (CDI) (mg/kg/day)	Adult: Potential Lifetime Cancer Risk (CDI x CSF)	Adult: Potential Hazard Index (HI) (CDI/(ED/70))/RfD	Child: Potential Chronic Daily Intake (CDI) (mg/kg/day)	Child: Potential Lifetime Cancer Risk (CDI x CSF)	Child: Potential Hazard Index (HI) (CDI/(ED/70))/RfD
Organics											
1,1-Dichloroethane	1.11E-02	1.11E-02	1.55E-01	ND	1.0E-01	3.6E-05	--	1.1E-03	2.9E-05	--	3.4E-03
1,1-Dichloroethene	6.07E-03	6.07E-03	5.40E-02	6.0E-01	9.0E-03	1.3E-05	8.0E-06	4.3E-03	1.1E-05	6.4E-06	1.4E-02
1,2-Dichloroethene (total)	2.01E-02	2.01E-02	2.92E-01	NC	9.0E-03	6.6E-05	--	2.2E-02	5.4E-05	--	7.0E-02
1,1,1-Trichloroethane	1.29E-01	1.29E-01	1.76E+00	NC	ND	4.1E-04	--	--	3.3E-04	--	--
Trichloroethene	1.89E-02	1.89E-02	1.38E+00	1.1E-02	6.0E-03	2.9E-04	3.2E-06	1.4E-01	2.4E-04	2.6E-06	4.6E-01
Vinyl chloride	3.49E-04	3.49E-04	7.40E-03	1.9E+00	ND	1.7E-06	3.1E-06	--	1.3E-06	2.5E-06	--
						Totals:	1.4E-05	1.7E-01	Totals:	1.2E-05	5.5E-01
							Total Lifetime Cancer Risk (Adult + Child) =			2.6E-05	

CDI = ((Leafy Vegetable Conc. x IR-lv) + (Garden Fruit Conc. x IR-gf) + (Root Vegetable Conc. x IR-rv) x EF x ED) / (BW x AT)

NC = Not Carcinogenic.

ND = Not Determined.

Exposure Assumptions

Adult:		Child:	
0.036	IR-lv = Leafy Vegetable Ingestion Rate (kg/day)	0.017	IR-lv = Leafy Vegetable Ingestion Rate (kg/day)
0.042	IR-gf = Garden Fruit Ingestion Rate (kg/day)	0.026	IR-gf = Garden Fruit Ingestion Rate (kg/day)
0.044	IR-rv = Root Vegetable Ingestion Rate (kg/day)	0.031	IR-rv = Root Vegetable Ingestion Rate (kg/day)
350	EF = Exposure Frequency (days/year)	350	EF = Exposure Frequency (days/year)
24	ED = Exposure Duration (years)	6	ED = Exposure Duration (years)
70	BW = Body Weight (kg)	15	BW = Body Weight (kg)
25550	AT = Averaging Time (days)	25550	AT = Averaging Time (days)

Table B–9

Central Tendency Calculations for Summary Table 6–5 in Uncertainty Analysis

			Exposure [a]	
Water Ingestion				
	Cancer		Child	Adult
		RME[b]	5.5E–06	9.4E–06
		CT[b]	8.5E–07	1.3E–06
		Ratio [CT/RME]	1.6E–01	1.4E–01
	Upper	TCE RME Risk	1.3E–03	2.3E–03
	Upper	TCE CT Risk	2.0E–04	3.1E–04
	Lower	1,1–DCE RME Risk	1.0E–04	1.8E–04
	Lower	1,1–DCE CT Risk	1.6E–05	2.5E–05
	Noncancer			
		RME[b]	6.4E–05	2.7E–05
		CT[b]	3.0E–05	1.3E–05
		Ratio (CT/RME)	4.7E–01	4.7E–01
	Upper	TCE RME HQ	2.4E+02	1.0E+02
	Upper	TCE CT HQ	1.1E+02	4.7E+01
Bathing/Inhalation				
	Cancer		Child	Adult
		RME[c]	4.1E–05	3.5E–05
		CT[c]	9.2E–06	6.9E–06
		Ratio (CT/RME)	2.2E–01	2.0E–01
	Upper	1,1–DCE RME Risk	1.1E–02	9.3E–03
	Upper	1,1–DCE CT Risk	2.5E–03	1.8E–03
	Lower	1,1–DCE RME Risk	1.5E–03	1.3E–03
	Lower	1,1–CT RME Risk	3.3E–04	2.5E–04
	Noncancer			
		RME[c]	4.8E–04	1.0E–04
		CT[c]	3.2E–04	6.9E–05
		Ratio (CT/RME)	6.7E–01	6.7E–01
	Upper	TCE RME HQ	1.1E+02	2.3E+01
	Upper	TCE CT HQ	7.4E+01	1.5E+01
Fruit/Veg Ingestion				
	Noncancer			
		RME[d]	6.4E–02	1.4E–02
		CT[d]	4.3E–02	9.2E–03
		Ratio (CT/RME)	6.7E–01	6.7E–01
	Upper	TCE RME HQ	4.4E+01	1.3E+01
	Upper	TCE CT HQ	2.9E+01	8.7E+00

[a] These exposure values do not include the "Cw" term in the appropriate algorithms. Refer to Tables 3–1, 3–2 and 3–3 for the equations.

[b] Refer to Table 3–1 and Table 6–4 to obtain variables.

[c] Refer to Table 3–2 and Table 6–4 to obtain variables.

[d] Refer to Table 3–3 and Table 6–4 to obtain variables.

APPENDIX C

GROUNDWATER DATA TREND ANALYSIS

APPENDIX C
GROUNDWATER DATA TREND ANALYSIS

C.1 INTRODUCTION

Presented in this section are several discussions pertaining to the groundwater data issues which emerged following EPA Region V review of the draft baseline risk assessment.

C.2 UPPER UNIT GROUNDWATER TREND ANALYSIS

The following trends are apparent from an examination of the upper unit well data from sampling years 1988, 1991 and 1992:

- In the most contaminated well, D-4-30, there is a clear decrease in all VOC concentrations over the four-year period, although the 1992 concentrations of several compounds are still quite high especially 1,1-dichloroethene, 1,1,1-trichloroethane, and trichloroethane.

- In well 5-7, although VOC levels are relatively low, there is a clear decrease in VOC concentrations over the four-year period (no 1988 data was available for well 5-4, so it is not possible to draw conclusions concerning this well).

- There is a clear decrease in all VOC concentrations over the four-year period in wells I-5 and I-7.

There are no clear trends in VOC concentrations in the L-series wells, or in wells I-2 and I-4.

This brief evaluation supports the approach to use all data from 1988 to 1992 for evaluation of the upper (shallow/intermediate) unit.

C.3 WELL LOCATIONS AND YIELDS RELATIVE TO THE SHALLOW AND INTERMEDIATE GROUNDWATER UNITS

The following table identifies which EKCO wells are completed in the shallow unit and which are completed in the deep unit. It also compares the Total VOCs of the two units. The groundwater sampling data is from the most recent complete sampling round and is part of the data set used for the Risk Assessment. The data shows that VOCs in both units range from levels that are negligible to very high. While there is a wide range of VOC concentrations in both units, neither of the units demonstrates VOC concentrations that are either generally higher or lower than the other. This is demonstrated by comparing the geometric mean of the two data sets.

The following table also presents the estimated sustainable yields of the shallow and intermediate wells. These data are rough estimates, but they show that the wells are generally low producing and there is no significant difference between the units.

Shallow On-Site Wells	Total VOC March 1992 (ug/L)	Estimated Sustainable Yield (gpm)
L-1	535	1
L-2	128	1
L-3	2	< 1
L-4	43	1
L-5	55	2
S-4	12	2
S-7	23	5
D-4-30	35,273	< 1
I-2	1,744	5

Geometric mean----------120

Intermediate On-Site Wells	Total VOC March 1992 (ug/L)	Estimated Sustainable Yield (gpm)
I-2	1,744	5
I-4	106	5
I-5	19	5
I-7	172	2

Geometric mean ---------160

C.4 R-SERIES WELLS WITH REPORT DATES 5/20/94 AND 6/22/94

The data set from 5/20/94 was a draft copy of the final data set reported on 6/22/94, and was inadvertently included in the appendix. Only data from the 6/22/94 data were evaluated in the risk assessment.

APPENDIX D

RESPONSE TO EPA V COMMENTS

APPENDIX D
RESPONSE TO EPA V COMMENTS
ON THE DRAFT BASELINE RISK ASSESSMENT

WESTON has reviewed the U.S. EPA Region V comments (EPA, 1994) for the draft baseline risk assessment (submitted on 11 August 1994) in the letter dated 24 October 1994 from Sally Averill, Project Manager, Technical Enforcement Section #1, RCRA Enforcement Branch. After discussing these comments with EPA Region V, we have prepared responses to each of the "General" and "Specific" numbered comments in the letter.

GENERAL COMMENTS

1. The comments are noted.

2. a) WESTON has evaluated garden produce ingestion in the lower aquifer as recommended in the comments. Refer to Section 3 of the final report for the revisions.

   b) Dense Non-Aqueous Phase Liquids (DNAPLs). DNAPLs in the upper groundwater unit underneath the EKCO facility have not been detected in two sampling studies conducted by WESTON for the RCRA Feasibility Investigation (RFI) (WESTON, 1993). The hypothetical presence of DNAPLs in unstaurated zones, composed of such chemicals as trichloroethene (TCE) and 1,1,1-trichloroethane (TCA), are unlikely based on numerous arguments which have been previously presented in this report (WESTON, 1993). However, the possibility of the presence of a DNAPL will not affect the human health risk characterization contained in this document.

WESTON conducted shallow depth-to-water (DTW) measurements on seven shallow-site wells (L-1 through L-5; S-4, and P-5) on three occasions in 1994 (15 February, 3 May and 10 August). The minimum DTW was 5.11 ft below ground surface (bgs) measured in well L-5 on 3 May. The average DTW calculated from all the shallow 1994 data was 12.50 bgs. This is based on the arithmetic mean of data collected from all seven wells during the three measurements. However, three of the wells (L-4, L-5 and S-4) included in the mean DTW estimation were in the flood plain where no houses are likely to be constructed. Exclusion of DTW data from these three wells yielded a minimum measured shallow groundwater DTW for 1994 of **14 bgs**, measured in well L-2 on 3 May, and an average DTW of **17 bgs**. Assuming a typical depth of 8 feet for a hypothetical residential basement, it is unlikely that measurable amounts of VOCs from hypothetical DNAPLs in the unsaturated zone would migrate to these basements during flooding, especially in view of the measured differential between the basement depth and the minimum DTW is 6 feet (i.e., minimum 14 ft bgs minus 8 ft basement depth).

3. "Individual" carcinogenic risks presented in the summary tables in the risk characterization chapter (Section 5) represented total individual lifetime cancer risk (adult plus child). WESTON revised the appropriate tables to reflect both child and adult risk. Appendix B presents the calculations for the child and adult exposure doses and risks.

4. WESTON revised Section 2 to explain the rationale for using the entire data set (1988 to 1991) for the upper unit. Also, please refer to revised Apendix C of this report, and to our response to "Specific Comment" #4 (EPA, 1994). These discussions further explain this issue, and why only 1994 data were used for the lower (bedrock) unit.

WESTON recalculated the exposure point concentrations (Section 2) and resultant doses (Section 3) and risks (Section 5) based on the inclusion of proxy concentrations that were eliminated in the draft risk assessment.

5. WESTON clarified the explanation of which on-site wells are located in the upper unit (Section 2) and more specifically, the shallow and intermediate units (Appendix C).

   Appendix C in the final report also presents an evaluation of yield rates for the shallow and intermediate wells, as requested by EPA Region V, for the upper unit wells.

6. EKCO Housewares Facility engineering personnel confirmed that industrial (worker) use of the underlying groundwater is not used for drinking water or showering purposes. Currently, groundwater at the facility is pumped, air-stripped and then used for non-contact cooling purposes. The rationale for not evaluating workers on-site was discussed in more detail in Section 3 of the final baseline risk assessment.

7. WESTON recalculated inhalation doses using the method of Andelman, as described in the RAGS "Part B" guidance (EPA, 1991). The exposure algorithm (Section 3) for inhalation during showering was revised to reflect the necessary inputs for this calculation.

8. A discussion of central tendency issues has been included in the Uncertainty Analysis. Representative calculations of central tendency were presented for the key chemicals and pathways that influenced risk calculated in the "high end" (RME) approach.

SPECIFIC COMMENTS

1. Executive Summary, Page ES-11, Paragraph 0. DNAPLs have not been detected in two separate occasions at the EKCO Housewares Facility. Refer to the RFI and CMS reports for detailed discussions.

2. Section 2, Page 2-1, Paragraph 1. Because interim actions were taken on the bedrock wells up to 1994, only 1994 data were appropriate for estimating current exposure and risk. Prior to retrofitting, the overburden aquifer had significant influence on the bedrock unit. Post-IRM data are most representative of the bedrock unit. This has been clarified in Section 2. For the upper (shallow/intermediate) units, WESTON expanded the discussion on the multiple data sets used (Section 2), and evaluated groundwater trends for the VOCs in Appendix C of this report.

3. Table 3-4. The 2% total organic carbon (TOC) soil value was obtained from the RFI report and was based on data for the soil type characterized for the site location. This has been clarified in the text of Section 3.

4. Appendix A. Identical R-series well data from 5/20/94 and 6/22/94 were reevaluated as requested to determine if any errors were made. The data from 5/20 were draft forms of the data presented as "final" in the 6/22 data set. This evaluation is discussed in Appendix C.

   Wells I-8, I-9, I-11, I-12, I-13, R-12, S-11 and S-12 are off-site well locations which were not evaluated in this risk assessment. Only on-site future uses were assessed. This is clarified in Section 2 of the final baseline risk assessment report.

REFERENCES

EPA (U.S. Environmental Protection Agency), 1989. *Risk Assessment Guidance for Superfund. Vol. 1. Human Health Evaluation Manual (Part A), Interim Final.* EPA/540/1-89/002.

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EPA (U.S. Environmental Protection Agency), 1994. *Technical Review Comments on the Baseline Risk Assessment for Volatile Organic Chemicals in Groundwater at the EKCO Housewares Facility in Massillon, Ohio.* Letter to P. McDonald (American Home Products Corporation) from S. Averill (U.S. EPA Region V). 24 October 1994. and Development, Washington, D.C. 10 July 1991.

WESTON (Roy F. Weston, Inc.), 1993. *RCRA Facility Investigation Report, EKCO Housewares Facility, Inc., Massillon, Ohio.* Roy F. Weston, Inc., 1 Weston Way, West Chester, PA 19380. May 1993